EXHIBIT 26

(REDACTED)

Attorneys' Eyes Only.

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MISSOURI
EASTERN DIVISION

Jonathan Searcy, on behalf of himself and all others similarly situated, and Ervin Kirk, on behalf of himself and all other similarly situated, Plaintiffs, v. Gilead Sciences, Inc., a foreign corporation, Defendant.	Case No. 4:20-cv-1523-MTS

EXPERT REPORT OF W. DAVID BRADFORD, PH.D.

DECEMBER 20, 2024

CONTENTS

I. QUALIFICATIONS

1. I am the George D. Busbee Chair in Public Policy, Professor in the Department of Public Administration, and Policy and Professor (by courtesy) in the Department of Economics at the University of Georgia. I previously served as Director of the Center for Health Economics and Policy Studies and Professor in the Department of Health Administration and Policy at the Medical University of South Carolina, and Associate and Assistant Professor in the Department of Economics at the University of New Hampshire.

2. I have over thirty years of research experience in the area of health economics in general. I have taught about the economics of the health care sector at the undergraduate, Master's, and Ph.D. levels for over thirty-five years at Louisiana State University, the University of New Hampshire, the Medical University of South Carolina, and the University of Georgia.

3. I have been the principal investigator on numerous funded grants and projects, including ones that have been funded by the federal government and have focused on issues in the healthcare industry. As of this writing, I have published over 130 articles in peer-reviewed journals, book chapters, and governmental reports. I also serve as Editor-in-Chief of the journal *Health Economics* and was formerly Associate Editor of *Implementation Research and Practice*. I am currently serving on the Board of the American Society of Health Economists.

4. I have testified as an expert witness in numerous cases related to the healthcare, hospital, health insurance, and pharmaceutical industries. My curriculum vitae and a list of cases in which I have testified as an expert within the preceding four years are attached hereto as **Appendix A**: *Curriculum Vitae*.

II. CASE BACKGROUND AND ASSIGNMENT

5. Jonathan Searcy and Ervin Kirk, on behalf of themselves and all others similarly situated (collectively, "Plaintiffs" or "Class Members"), brought this action against Gilead Sciences, Inc. ("Gilead"), alleging Gilead engaged in unlawful conduct in connection with the sale and marketing of tenofovir disoproxil fumarate ("TDF"), a prescription drug used to treat human immunodeficiency virus ("HIV").[1] Specifically, Plaintiffs allege that Gilead both misrepresented the safety and efficacy of the HIV treatment drug tenofovir alafenamide ("TAF") in comparison to TDF, as well as delayed

[1] Third Amended Class Action Complaint. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Mar. 28, 2023) ("Complaint") ¶ 1.

seeking approval of TAF with the U.S. Food and Drug Administration ("FDA") in order to boost its profits via increased sales of TDF.[2]

6. Plaintiffs claim that, as a result of Gilead's misrepresentations surrounding TAF and TDF, Plaintiffs purchased TDF in Missouri at "artificially high prices," from July 2003 through October 2015 ("Class Period"), leading to the unjust enrichment of Gilead at the "expense of Missouri patients."[3] Plaintiffs further allege that they were denied the benefit of the bargain for obtaining TAF-based prescriptions and paid too much for TDF-based prescriptions, as a result of the market price for TDF-based drugs exceeding the market price that would have existed but for Gilead's misconduct.[4]

7. I understand that the Plaintiffs seek to certify a class of patients in this matter, and that this class would be defined as:

> All persons who purchased any TDF-based drug, including Atripla, Complera, Stribild, Truvada, or Viread, in Missouri, primarily for personal, family or household purposes between July 1, 2003, and November 1, 2015.

I understand from counsel that this class would exclude Gilead, its parents, subsidiaries, and affiliates, and their officers, directors, employees, and agents; the judicial officers assigned to this case, as well as members of their staffs and immediate families. I further understand that this class would exclude Missouri residents who, before the entry of judgment in this case, have filed claims that they suffered a personal injury from TDF medication, including any person who is, has been, or becomes a plaintiff identified by name claiming personal injuries in: (i) the coordinated proceeding entitled *Gilead Tenofovir Cases*, JCCP No. 5043 (S.F. Super. Ct.); (ii) the action entitled *Holley v. Gilead Sciences, Inc.*, No. 4:18-cv-06972-JST (N.D. Cal.) ("*Holley*"); or (iii) any action consolidated for pretrial purposes with *Holley*.

8. I have been retained by Plaintiffs, through their counsel Stueve Siegel Hanson LLP, to analyze and opine on whether a common methodology supported by economic principles can be used to ascertain class wide damages attributable to Gilead's alleged misconduct during the Class Period. I understand from counsel that damages are to be calculated to include the lost "benefit of the bargain," to Class Members, and separately, the unjust enrichment that Gilead received due to its misconduct.

[2] Complaint ¶¶ 19, 21-26.
[3] Complaint ¶ 1.
[4] Complaint ¶ 82.

9. A complete list of the documents and data that I considered in reaching my conclusions in this matter is provided in **Appendix B**: *Materials Considered*.

10. The current hourly rate for my work is $1,200. My compensation is not affected by my findings or the outcome of this litigation. I supervised and directed a team at Vega Economics to assist me in this assignment. Their compensation is not affected by my findings or the outcome of this litigation.

III. SUMMARY OF OPINIONS

11. Based on my review of the record, my experience, and my professional judgment, I conclude that:

- Gilead's misconduct led to a higher market price for TDF-based drugs than would have existed in a but-for world in which Gilead had accurately represented the safety and efficacy of TDF and not delayed seeking FDA approval of TAF.
- There exists a class-wide methodology based on a common set of documents, data, and facts to calculate damages attributable to Gilead's misconduct during the Class Period, which deprived Class Members of the benefit of the bargain from purchasing TDF-based drugs.
- There exists a class-wide methodology to calculate the unjust enrichment that Gilead received due to its alleged misconduct.

12. My full conclusions are contained in the body of this report.

13. I hold the opinions stated in this report with a reasonable degree of professional certainty. I reserve the right to amend or supplement my opinions and report, if appropriate, based on any additional discovery, or in response to opinions or reports of other experts in this matter. If I am called upon to testify at trial, I also reserve the right to employ demonstrative exhibits that summarize facts or opinions that are disclosed in this report or new information that subsequently becomes available.

14. In forming my opinions, I have considered various sources of pharmaceutical data that are routinely relied upon by economists in analyzing the healthcare and pharmaceutical industries, as well as by healthcare and pharmaceutical companies. For example, among the sources I rely on is the IQVIA (formerly IMS) data which is widely regarded as the gold standard for pharmaceutical sales tracking, with academic researchers and pharmaceutical companies, including Gilead,[5] relying on its

[5] *See, e.g.*, "Q1 23 Resource Book." *Gilead Sciences, Inc.* (April 2023). <https://s29.q4cdn.com/585078350/files/doc_financials/2023/q1/GILD-Q123-Resource-Book-28-April-2023.pdf> (accessed Dec. 17, 2024) at 11.

comprehensive and rigorously validated datasets.[6] By providing accurate, granular insights into prescription volumes and market shifts, it serves as a critical reference point for scholarly studies and evidence-based decision making. I also rely on Bloomberg's Symphony Health database, which is similarly respected for its comprehensive, high-quality pharmaceutical market information, making it a trusted benchmark for both industry professionals and academic research.[7]

IV. RELEVANT BACKGROUND

A. TDF and TAF

15. TDF is in a class of HIV medications called nucleoside reverse transcriptase inhibitors ("NRTIs").[8] TDF is sold under the brand name Viread, as well as in branded and generic combination pills.[9] TDF

[6] *See, e.g.*, Kållberg, Cecilia, et al. "The Effect of Generic Market Entry on Antibiotic Prescriptions in the United States." *Nature Communications* 12.1 (2021): 2937 (a study by academics at the John Hopkins School of Medicine, Johns Hopkins Bloomberg School of Public Health, Princeton University, and more using the IQVIA Xponent database to analyze usage of thirteen antibiotics before and after generic market entry); Schieber, Lyna Z., et al. "Trends and Patterns of Geographic Variation in Opioid Prescribing Practices by State, United States, 2006-2017." *JAMA Network Open* 2.3 (2019): e190665 (researchers from the Centers for Disease Control and Prevention using IQVIA Xponent data to "estimate temporal trends and geographic variations in 6 key opioid prescribing measures in 50 states and the District of Colombia."); "Antibiotic Resistance Patient Safety Portal." *Centers for Disease Control and Prevention* (Nov. 28, 2023). <https://arpsp.cdc.gov/resources/OAU-Data-Methods-2022.pdf> (accessed Dec. 17, 2024) (a document from the Centers for Disease Control and Prevention describing an antibiotic resistance patient safety portal, also using IQVIA data); Beshearse, Elizabeth M., et al. "Comparison of Outpatient Antibiotic Prescriptions Among Older Adults in IQVIA Xponent and Publicly Available Medicare Part D Data, 2018." *Antimicrobial Stewardship & Healthcare Epidemiology* 3 (2023): 1-4 at 1 (validating IQVIA data against CMS data and finding that "[t]he distributions of antibiotic prescriptions by geography, antibiotic class, and prescriber specialty are similar in the US Centers for Medicare and Medicaid Services (CMS) Part D Prescriber Public Use Files and IQVIA Xponent dataset"); "Data Science and Big Data Analytics." *Bates White*. <https://www.bateswhite.com/practices-Data-science-big-data-analytics.html> (accessed Dec. 17, 2024) ("Companies such as IQVIA and Truven Health Analytics and government agencies such as the Food and Drug Administration and Centers for Medicare and Medicaid Services publish various types of large, structured data. Together, these private and public data sources contain billions of records that are commonly used in litigation.").

[7] *See, e.g.*, "Data Science and Big Data Analytics." *Bates White*. <https://www.bateswhite.com/practices-Data-science-big-data-analytics.html> (accessed Dec. 17, 2024) (naming "Symphony Health" alongside IQVIA as a data source used for "[b]ig data assessment of price-fixing allegations"); Rymer, Jennifer A., et al. "Difference in Medication Adherence Between Patients Prescribed a 30-Day Versus 90-Day Supply After Acute Myocardial Infarction." *Journal of the American Heart Association* 10.1 (2021): 1-9 at 2 ("Symphony Health data contain prescriber information for 280 million patients and 1.8 million prescribers in the United States. The pharmacy claims capture is ≈92% of the retail and 68% of mail orders. It includes claims submitted to all payer types, including commercial plans, Medicare, and Medicaid. These are adjudicated claims collected from major US clearing houses as well as large national retail, mail order, and specialty pharmacy chains.").

[8] "Drug Database: Tenofovir Disoproxil Fumarate." *Clinicalinfo.hiv.gov* (Apr. 5, 2024). <https://clinicalinfo.hiv.gov/en/drugs/tenofovir-disoproxil-fumarate/patient> (accessed Nov. 12, 2024).

[9] "Tenofovir Disoproxil Fumarate (Viread)." *International Association of Providers of AIDS Care* (June 2024). <https://www.iapac.org/fact-sheet/tenofovir-disoproxil-fumarate-viread> (accessed Nov. 13, 2024).

is an antiretroviral medication that is prescribed usually in combination with other HIV drugs and works by inhibiting enzymes that are necessary for the HIV virus to replicate.[10]

16. TDF is manufactured and sold in branded forms and combinations by Gilead.[11] Generic forms of TDF became available starting in late 2017 and are now sold by multiple manufacturers including Teva, Aurobindo, and Chartwell.[12]

17. TDF therapy can have serious side effects. Clinicalinfo.hiv.gov, which provides information about HIV/AIDS treatment, prevention, and research in collaboration with the National Institute of Health's Office of AIDS Research,[13] prominently warns in its listing for the drug that "[t]enofovir disoproxil fumarate (tenofovir DF) can cause serious, life-threatening side effects. These include a buildup of lactic acid in the blood (lactic acidosis), liver problems, and new or worsening kidney problems, including kidney failure."[14] The listing for TAF does not have the same warning.[15]

18. TAF is also an NRTI and is used in antiretroviral therapy to treat HIV.[16] It is sold under the brand name Vemlidy, as well as in combination pills.[17] TAF has a similar mechanism of action to TDF in that it inhibits viral replication of HIV.[18] Though side effects still exist, TAF was "developed in order to improve renal safety when compared to the counterpart tenofovir disoproxil," and "has been

---

[10] "Tenofovir Disoproxil." *Drugbank Online* (Nov. 12, 2024). <https://go.drugbank.com/drugs/DB00300> (accessed Nov. 13, 2024).
[11] "Generic Viread Availability." *Drugs.com* (Nov. 6, 2024). <https://www.drugs.com/availability/generic-viread.html> (accessed Nov. 13, 2024).
[12] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2016) at 15 ("In 2013, Gilead and Teva Pharmaceuticals (Teva) reached an agreement in principle to settle the ongoing patent litigation concerning the four patents that protect tenofovir disoproxil fumarate in our Viread, Truvada and Atripla products. Under the agreement, Teva will be allowed to launch a generic version of Viread on December 15, 2017."); "Generic Viread Availability." *Drugs.com* (Nov. 6, 2024). <https://www.drugs.com/availability/generic-viread.html> (accessed Nov. 13, 2024); "Teva Announces Exclusive Launch of Generic Viread in the United States." *Teva* (Dec. 15, 2017). <https://www.tevapharm.com/news-and-media/latest-news/teva-announces-exclusive-launch-of-generic-viread-in-the-united-states> (accessed Nov. 13, 2024).
[13] "Home." *Clinicalinfo.hiv.gov*. <https://clinicalinfo.hiv.gov/en> (accessed Nov. 13, 2024).
[14] "Drug Database: Tenofovir Disoproxil Fumarate." *Clinicalinfo.hiv.gov* (Apr. 5, 2024). <https://clinicalinfo.hiv.gov/en/drugs/tenofovir-disoproxil-fumarate/patient> (accessed Nov. 12, 2024).
[15] *See* "Drug Database: Tenofovir Alafenamide." *Clinicalinfo.hiv.gov* (Apr. 15, 2024). <https://clinicalinfo.hiv.gov/en/drugs/tenofovir-alafenamide/patient> (accessed Nov. 13, 2024).
[16] "Drug Database: Tenofovir Alafenamide." *Clinicalinfo.hiv.gov* (Apr. 15, 2024). <https://clinicalinfo.hiv.gov/en/drugs/tenofovir-alafenamide/patient> (accessed Nov. 13, 2024); "Tenofovir Alafenamide." *Drugbank Online* (Aug. 26, 2024). <https://go.drugbank.com/drugs/DB09299> (accessed Nov. 13, 2024).
[17] "Drug Database: Tenofovir Alafenamide." *Clinicalinfo.hiv.gov* (Apr. 15, 2024). <https://clinicalinfo.hiv.gov/en/drugs/tenofovir-alafenamide/patient> (accessed Nov. 13, 2024).
[18] "Tenofovir Alafenamide." *Drugbank Online* (Aug. 26, 2024). <https://go.drugbank.com/drugs/DB09299> (accessed Nov. 13, 2024).

reported to produce a large antiviral efficacy at doses ten times lower than tenofovir disoproxil."[19] TAF is sold in branded forms by Gilead, with no generic forms yet being sold to the public as brand exclusivity has not yet expired.[20]

19. The FDA approval dates of Gilead's branded TDF-based drugs, and their corresponding generic and branded TAF counterparts, are shown in **Table 1**: *Branded TDF and TAF Approval Dates* and **Table 2***: Branded and Generic TDF Approval Dates*.

Table 1: *Branded TDF and TAF Approval Dates*[21]

TDF Drug	Approval Date	TAF Drug	Approval Date
Viread	October 2001	Vemlidy	2016 (HBV only)[22]
Truvada	August 2004	Descovy	April 2016
Complera	August 2011	Odefsey	March 2016
Stribild	August 2012	Genvoya	November 2015
Atripla	July 2006	N/A	N/A
N/A	N/A	Biktarvy	February 2018

[19] "Tenofovir Alafenamide." *Drugbank Online* (Aug. 26, 2024). <https://go.drugbank.com/drugs/DB09299> (accessed Nov. 13, 2024).
[20] "Generic Vemlidy Availability." *Drugs.com* (Nov. 6, 2024). <https://www.drugs.com/availability/generic-vemlidy.html> (accessed Nov. 13, 2024).
[21] "Drugs@FDA: FDA-Approved Drugs, NDA 021356." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021356> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 021752." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021752> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 202123." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=202123> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 203100." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=203100> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 021937." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021937> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 208464." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208464> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 208215." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208215> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 208351." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208351> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 207561." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=207561> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 210251." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=210251> (accessed Dec. 13, 2024).
[22] Vemlidy was approved to treat Hepatitis B infection ("HBV") only and is not approved as a standalone medication to treat HIV. "Vemlidy (Tenofovir Alafenamide) Tablets Label." *U.S. Food & Drug Administration* (Nov. 2016). <https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/208464s000lbl.pdf> (accessed Dec. 13, 2024).

Table 2*: Branded and Generic TDF Approval Dates*[23]

TDF Brand Drug	Approval Date	TDF Generic Drug	Approval Date
Viread	October 2001	Tenofovir Disoproxil Fumarate	March 2015
Truvada	August 2004	Emtricitabine, Tenofovir Disoproxil Fumarate	June 2017
Complera	August 2011	Rilpivirine, Emtricitabine, Tenofovir Disoproxil Fumarate	November 2017 (tentative)[24]
Stribild	August 2012	N/A	N/A
Atripla	July 2006	Efavirenz, Emtricitabine, Tenofovir Disoproxil Fumarate	September 2018

B. Gilead's History with TDF and TAF

20. In 1997, tenofovir, an intravenous antiviral medication developed in the Czech Republic, was modified by Gilead to create tenofovir disoproxil such that it could be taken orally.[25] On October 26,

[23] "Drugs@FDA: FDA-Approved Drugs, NDA 021356." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021356> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 021752." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021752> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 202123." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=202123> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 203100." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=203100> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, NDA 021937." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021937> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, ANDA 091612." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=091612> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, ANDA 090894." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=090894> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, ANDA 208452." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208452> (accessed Dec. 13, 2024); "Drugs@FDA: FDA-Approved Drugs, ANDA 203041." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=203041> (accessed Dec. 13, 2024).

[24] Generic Complera has never been marketed. The drug received a tentative approval in November 2017, and that status is presently unchanged. "Drugs@FDA: FDA-Approved Drugs, ANDA 208452." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208452> (accessed Dec. 13, 2024).

[25] Peterson, Melody. "A History of Gilead's Biggest HIV Drug." *The Los Angeles Times* (May 29, 2016). <https://www.latimes.com/business/la-fi-gilead-timeline-20160527-snap-story.html> (accessed Nov. 12, 2024); De Clercq, Erik. "Tribute to John C. Martin at the Twentieth Anniversary of the Breakthrough of Tenofovir in the Treatment of HIV Infections." *Viruses* 13.12 (2021): 1-12 at 5.

2001, the FDA approved Viread, a single 300 mg tablet taken once daily, for the treatment of HIV infections.[26] The last patent for Viread was set to expire in 2018.[27]

21. In 2001, Gilead scientists published research on a new formulation of tenofovir, TAF.[28] Gilead soon began early phase clinical trials to study TAF in patients, though the results of Gilead's main trial would not be released until 2014.[29] However, internally, the company was aware of the advantageous safety profile and efficacy of TAF and made frequent public statements touting the potential of TAF. Prior to beginning Phase I clinical trials of TAF, Gilead anticipated TAF to have greater efficacy in comparison to Viread:

> Both GS 7340[30] and Viread are processed in the body to yield the same active chemical, tenofovir, within cells. However, the chemical composition of GS 7340 may allow it to cross cell membranes more easily than Viread, so that with GS 7340, tenofovir may be present at much higher levels within cells. As a result, GS 7340 may have greater potency than Viread and may inhibit low-level HIV replication in cells that are otherwise difficult to reach with reverse transcriptase inhibitors.[31]

22. At the 9th Conference on Retroviruses in February 2002, Gilead researchers presented promising pre-clinical results of TAF testing.[32] Commenting on the findings, Gilead's vice president of

---

[26] "Viread Approval Letter." *U.S. Food and Drug Administration* (Oct. 26, 2001). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2001/21-356_Viread.cfm> (accessed Nov. 12, 2024); "Gilead's Investigational Antiretroviral Agent Viread™ Reduces Viral Load in HIV Patients with Resistant Virus in Pivotal Phase III Study." *Gilead Sciences, Inc.* (Sept. 25, 2001). <https://www.gilead.com/news/news-details/2001/gileads-investigational-antiretroviral-agent-viread-reduces-viral-load-in-hiv-patients-with-resistant-virus-in-pivotal-phase-iii-study> (accessed Nov. 12, 2024).

[27] Peterson, Melody. "A History of Gilead's Biggest HIV Drug." *Los Angeles Times* (May 29, 2016). <https://www.latimes.com/business/la-fi-gilead-timeline-20160527-snap-story.html> (accessed Nov. 14, 2024).

[28] Peterson, Melody. "A History of Gilead's Biggest HIV Drug." *Los Angeles Times* (May 29, 2016). <https://www.latimes.com/business/la-fi-gilead-timeline-20160527-snap-story.html> (accessed Nov. 14, 2024); Eisenberg, Eugene J., Gong-Xin He, and William A. Lee. "Metabolism of GS-7340, a Novel Phenyl Monophosphoramidate Intracellular Prodrug of PMPA, in Blood." *Nucleosides Nucleotides Nucleic Acids* 20 (2001): 1091-98; Chapman, H., et al. "Purification of PMPA Amidate Prodrugs by SMB Chromatography and X-Ray Crystallography of the Diastereomerically Pure GS-7340." *Nucleosides Nucleotides Nucleic Acids* 20 (2001): 1085-1090.

[29] Peterson, Melody. "A History of Gilead's Biggest HIV Drug." *Los Angeles Times* (May 29, 2016). <https://www.latimes.com/business/la-fi-gilead-timeline-20160527-snap-story.html> (accessed Nov. 14, 2024) ("**April 2002** Gilead pays doctors to test TAF in HIV patients, including in Los Angeles. The positive results aren't published until 2014."); Markowitz, Martin, et al. "Phase I/II Study of the Pharmacokinetics, Safety and Antiretroviral Activity of Tenofovir Alafenamide, a New Prodrug of the HIV Reverse Transcriptase Inhibitor Tenofovir, in HIV-Infected Adults." *Journal of Antimicrobial Chemotherapy* 69 (2014): 1362-69 at 1365 ("A total of 30 subjects (27 males and 3 females) were enrolled in the study from 2 April 2002 to 22 January 2003.")

[30] TAF was formerly referred to as GS 7340.

[31] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2001) at 12.

[32] "Special Coverage: 9th Conference on Retroviruses - New Drugs, New Data Hold Promise for Next Decade of HIV Treatment." *Relias Media* (May 1, 2002). <https://www.reliasmedia.com/articles/76107-special-coverage-9th-

corporate development was quoted as saying that TAF is "taken up at the macrophages of lymphocytes more selectively and concentrates a greater amount of tenofovir in it" with the reported goal of "deliver[ing] a more potent version of tenofovir that can be taken in lower doses, resulting in better antiviral activity and fewer side effects[.]"[33] At this point, Gilead seemed excited about creating the "once-a-day drug" that "everybody wants," citing a "great need to improve therapy for HIV patients" such that "patient adherence is maximized, and…we can keep patients healthier for longer periods of time."[34]

23. Gilead continued to espouse such statements in its annual reports following the beginning of Phase I/II clinical trials of TAF, stating that the chemical composition of TAF may lead to greater potency than Viread.[35] On January 29, 2004, Gilead reported "favorable Phase I/II results" from the early clinical study of TAF.[36]

24. Seven months later, in October of 2004, Gilead abruptly discontinued development of TAF as it "d[id] not believe that GS 7340 ha[d] a profile that differentiate[d] it to an extent that support[ed] its continued development," given the established "safety, tolerability, and efficacy" of Gilead's other HIV products.[37]

25. Gilead's abrupt decision to go back on its prior representations of TAF as an exciting new product and instead shelve the research was made in the context of powerful economic motivators. At the time, Gilead was dependent on its sales of HIV products, specifically Viread, to support its operations. In 2002, Viread generated $225.8 million in product sales and royalty revenues, accounting for 48 percent of Gilead's total revenues.[38] Viread's importance to Gilead's revenues

---

conference-on-retroviruses-new-drugs-new-data-hold-promise-for-next-decade-of-hiv-treatment> (accessed Nov. 14, 2024).

[33] "Special Coverage: 9th Conference on Retroviruses - New Drugs, New Data Hold Promise for Next Decade of HIV Treatment." *Relias Media* (May 1, 2002). <https://www.reliasmedia.com/articles/76107-special-coverage-9th-conference-on-retroviruses-new-drugs-new-data-hold-promise-for-next-decade-of-hiv-treatment> (accessed Nov. 14, 2024).

[34] "Special Coverage: 9th Conference on Retroviruses - New Drugs, New Data Hold Promise for Next Decade of HIV Treatment." *Relias Media* (May 1, 2002). <https://www.reliasmedia.com/articles/76107-special-coverage-9th-conference-on-retroviruses-new-drugs-new-data-hold-promise-for-next-decade-of-hiv-treatment> (accessed Nov. 14, 2024).

[35] *See* Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2002) at 7; Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2003) at 7.

[36] "Gilead Sciences Announces Fourth Quarter and Full Year 2003 Financial Results." *Gilead Sciences, Inc.* (Jan. 29, 2004). <https://www.gilead.com/news/news-details/2004/gilead-sciences-announces-fourth-quarter-and-full-year-2003-financial-results> (accessed Dec. 19, 2024).

[37] "Gilead Discontinues Development of GS 9005 and GS 7340; Company Continues Commitment to Research Efforts in HIV." *Gilead Sciences, Inc.* (Oct. 21, 2004). <https://www.gilead.com/news/news-details/2004/gilead-discontinues-development-of-gs-9005-and-gs-7340-company-continues-commitment-to-research-efforts-in-hiv> (accessed Nov. 12, 2024).

[38] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2002) at 2.

only increased the following year as the drug generated $566.5 million in sales, or 65 percent of Gilead's total revenues.[39]

26. Gilead's dependence on its limited number of products, especially TDF forms, grew further in 2004. Gilead identified that it was "dependent on sales of [its] HIV products," with sales of HIV products[40] and AmBisome[41] accounting for 90 percent of total product revenues.[42] Gilead further stated that if it was "unable to maintain or continue growing sales of [its] HIV products or to maintain sales of AmBisome, [its] results of operations may be adversely affected."[43] In other words, existing branded TDF-based HIV product sales were critical to Gilead's operations.

27. Competition within the HIV market was also a financial concern for Gilead. Gilead identified that a "large part of the market for [its] HIV products are patients who are already taking other HIV drugs," and acknowledged that if efforts to persuade physicians to change patient prescriptions to Gilead HIV products were unsuccessful, its sales would be limited.[44] Additionally, Gilead was concerned that its "ability to maintain pricing" would be affected as generic HIV products entered the market.[45] Thus, maintaining the success of TDF-based product offerings, such as Viread and Truvada, was crucial to Gilead's business.

28. Against this backdrop, Gilead had a far more powerful economic incentive to delay the introduction of TAF than it did to push it to production, precisely because TAF was so promising. Introducing TAF at this time almost certainly would have caused many existing patients taking TDF to switch to TAF, as occurred when TAF ultimately was introduced in late 2015.[46] While strong TAF sales would of course have been to Gilead's benefit, this also would have meant that Gilead lost out on revenue from potential TDF sales that would have occurred, but for TAF's introduction. Instead, if Gilead delayed the entry of TAF (and the start of the accompanying exclusivity period for the drug),[47]

---

[39] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2003) at 2.
[40] Gilead's HIV products were Viread, Emtriva, and Truvada. 86 percent of HIV product sales in 2004 were attributable to Viread. *See* Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2004) at 2, 15.
[41] AmBisome, or amphotericin B liposome for injection, treats fungal infection. *See* Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2004) at 2, 15.
[42] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2004) at 15.
[43] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2004) at 15.
[44] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2004) at 16.
[45] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2004) at 16.
[46] Genvoya, Gilead's first TAF-based drug, was approved by the FDA on November 5, 2015. *See* "Approval Package for Genvoya." *U.S. Food and Drug Administration* (Nov. 5, 2015). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2015/207561Orig1s000Approv.pdf> (accessed Nov. 14, 2024).
[47] Dickson, Sean and Amy Killelea. "Intentionally Delayed Pharmaceutical Innovation Under Perverse Incentives: Gilead's HIV Pipeline as a Case Study." *Health Affairs Forefront* (June 16, 2021).

Gilead could maximize the sales of both TDF and TAF, increasing its expected total revenue and extending the timeline in which Gilead could reasonably expect to have exclusivity over a blockbuster HIV drug.

29. Gilead's behavior can be characterized as product hopping, and it is not new.[48] The exclusivity period granted to new drugs, separate from their patent expiration dates, can incentivize artificial timing of market entry to maximize profits.[49] Other pharmaceutical companies have been accused of engaging in similar product hopping behavior, including AstraZeneca (with its heartburn drugs Prilosec and Nexium)[50] and Forest Laboratories (with antidepressants Celexa and Lexapro).[51]

30. Gilead's actions came with consequences. Due to widespread, chronic use of TDF as the preferred HIV treatment, side effects of decreases in bone density and kidney toxicity are well-documented.[52] Gilead was aware as early as 1999 that TDF may cause kidney toxicity issues in later stages of clinical trials, as it had recently discontinued development of a similar drug at the recommendation of the FDA due to the same issue.[53] Gilead believed lower doses of this similar drug would not result

<https://www.healthaffairs.org/content/forefront/intentionally-delayed-pharmaceutical-innovation-under-perverse-incentives-gilead-s-hiv> (accessed Nov. 14, 2024) ("Because Gilead was publishing data on TAF in the early 2000s, it had to file patents then to protect its invention; these patents could expire around the same time as TDF's patents or be more easily challenged by generic manufacturers. Instead, Gilead is relying heavily on exclusivities generated by the Food, Drug, and Cosmetic Act (FDCA) to protect TAF. These FDCA exclusivities create a perverse incentive to delay introduction of pharmacologic improvements until right before the patents on the original drug expire, delaying patient access to better therapies.").

[48] Dickson, Sean and Amy Killelea. "Intentionally Delayed Pharmaceutical Innovation Under Perverse Incentives: Gilead's HIV Pipeline as a Case Study." *Health Affairs Forefront* (June 16, 2021). <https://www.healthaffairs.org/content/forefront/intentionally-delayed-pharmaceutical-innovation-under-perverse-incentives-gilead-s-hiv> (accessed Nov. 14, 2024).

[49] Dickson, Sean and Amy Killelea. "Intentionally Delayed Pharmaceutical Innovation Under Perverse Incentives: Gilead's HIV Pipeline as a Case Study." *Health Affairs Forefront* (June 16, 2021). <https://www.healthaffairs.org/content/forefront/intentionally-delayed-pharmaceutical-innovation-under-perverse-incentives-gilead-s-hiv> (accessed Nov. 14, 2024).

[50] Harris, Gardiner. "Prilosec's Maker Switches Users to Nexium, Thwarting Generics." *The Wall Street Journal* (June 6, 2002). <https://globalag.igc.org/health/us/switch.htm> (accessed Dec. 17, 2024).

[51] Harris, Gardiner. "Document Details Plan to Promote Costly Drug." *The New York Times* (Sept. 1, 2009). <https://www.nytimes.com/2009/09/02/business/02drug.html?_r=2&hp> (accessed Dec. 9, 2024).

[52] *See e.g.,* Wassner, Chanie, Nicole Bradley, and Yuman Lee. "A Review and Clinical Understanding of Tenofovir: Tenofovir Disoproxil Fumarate Versus Tenofovir Alafenamide." *Journal of the International Association of Providers of AIDS Care* 19 (2020): 1-10 at 2; Ryon, Lene, et al. "Association Between Antiretroviral Exposure and Renal Impairment Among HIV-Positive Persons With Normal Baseline Renal Function: the D:A:D Study." *The Journal of Infectious Diseases* 207 (2013): 1359-69; Bedimo, Roger, et al. "Osteoporotic Fracture Risk Associated with Cumulative Exposure to Tenofovir and Other Antiretroviral Agents." *AIDS* 26.7 (2012): 825-831.

[53] TDF "has a structure and activity very similar" to adefovir dipivoxil. Adefovir dipivoxil, at the 60 mg dose, showed concerns of kidney toxicity during Phase III clinical trials and thus the FDA Advisory Panel recommended against approval. *See* Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 1999) at 7.

in the same kidney toxicity.[54] Gilead stated in its 2003 annual report that "kidney toxicity has been reported with post-approval use of Viread" and updated the drug label accordingly.[55]

31. Furthermore, Gilead was aware that TAF demonstrated higher efficacy at far lower doses than TDF, meaning that certain serious side effects would be far less likely to occur in TAF users than in TDF users. In an early 2012 announcement of the Phase II clinical trial of TAF, Gilead stated that "[i]n previous studies, GS-7340 has demonstrated the ability to provide greater antiviral efficacy at a dose that is ten times lower than Viread."[56] Additionally, Gilead's Chief Scientific Officer and EVP of Research and Development stated that TAF's ability to be dosed once-daily and at one-tenth the dose of Viread may enable the development of a range of single-tablet HIV regimens that "optimize clinical efficacy, safety and tolerability[.]"[57]

32. Gilead subsequently filed NDAs for four TAF-based treatments from late 2014 through early 2016.[58] A year prior to the first filing, Gilead and Teva Pharmaceutical Industries Ltd. ("Teva") reached an agreement regarding ongoing patent litigation for Viread that granted Teva the ability to launch a generic on December 15, 2017.[59] By filing NDAs for its TAF-based drugs shortly prior to the first

---

[54] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 1999) at 28.
[55] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2002) at 24. *See also* "U.S. FDA Grants Traditional Approval for Gilead's Once-Daily HIV Medications Truvada and Viread." *Gilead Sciences, Inc.* (Mar. 8, 2006) (GILTDF111602271825 at GILTDF111602271827).
[56] "Gilead Initiates Phase 2 Clinical Trial Evaluating GS-7340, A Low-Dose Novel Prodrug of Tenofovir for the Treatment of HIV." *Gilead Sciences, Inc.* (Jan. 24, 2012). <https://www.gilead.com/news/news-details/2012/gilead-initiates-phase-2-clinical-trial-evaluating-gs-7340-a-low-dose-novel-prodrug-of-tenofovir-for-the-treatment-of-hiv> (accessed Nov. 13, 2024).
[57] "Gilead Initiates Phase 2 Clinical Trial Evaluating GS-7340, A Low-Dose Novel Prodrug of Tenofovir for the Treatment of HIV." *Gilead Sciences, Inc.* (Jan. 24, 2012). <https://www.gilead.com/news/news-details/2012/gilead-initiates-phase-2-clinical-trial-evaluating-gs-7340-a-low-dose-novel-prodrug-of-tenofovir-for-the-treatment-of-hiv> (accessed Nov. 13, 2024).
[58] "Approval Package for Genvoya." *U.S. Food and Drug Administration* (Nov. 5, 2015). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2015/207561Orig1s000Approv.pdf> (accessed Nov. 14, 2024); "Approval Package for Vemlidy." *U.S. Food and Drug Administration* (Nov. 10, 2016). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2016/208464Orig1s000Approv.pdf> (accessed Nov. 14, 2024); "Approval Package for Descovy." *U.S. Food and Drug Administration* (Apr. 4, 2016). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2016/208215Orig1s000Approv.pdf> (accessed Nov. 14, 2024); "Approval Package for Odefsey." *U.S. Food and Drug Administration* (Mar. 1, 2016). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2016/208351Orig1s000Approv.pdf> (accessed Dec. 19, 2024).
[59] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2016) at 15 ("In 2013, Gilead and Teva Pharmaceuticals (Teva) reached an agreement in principle to settle the ongoing patent litigation concerning the four patents that protect tenofovir disoproxil fumarate in our Viread, Truvada and Atripla products. Under the agreement, Teva will be allowed to launch a generic version of Viread on December 15, 2017."); "Gilead and Teva Reach Settlement Agreement in Viread® Patent Litigation." *Gilead Sciences, Inc.* (Feb. 19, 2013). <https://www.gilead.com/news/news-details/2013/gilead-and-teva-reach-settlement-agreement-in-viread-patent-litigation> (accessed Nov. 14, 2024). *See also* "Teva Announces Exclusive Launch of Generic Viread in the United

market generic version of TDF-based drugs launching, Gilead was able to maintain a level of market dominance for its HIV products that would have been otherwise unattainable.

33. The enhanced safety profile of TAF was soon corroborated by outside researchers. A research review by doctors at Groupe Hospitalier Pitié-Salpêtrière Charles Foix and other Parisian institutions highlighted that "numerous cohort studies and case reports have highlighted the significant risk for renal toxicity since [TDF's] market approval in 2001" and concluded that "Pharmacological data support an improved renal safety profile of TAF compared with TDF."[60] A review of recent studies from 2016 from the British HIV Association noted:

> The evidence to date suggests that this TAF-containing regimen offers high virological success rates that are similar to those of TDF-based regimens, with a more favourable safety and tolerability profile, characterized by less impact on multiple measures of renal function and less impact on [bone mineral density] in both treatment-naïve and treatment experienced patients. Indeed, data from studies in virologically suppressed patients with either normal renal function or mild to moderate renal impairment (eGFR 30–69 mL/min), suggest that TAF may offer TFV-equivalent potency together with an improved renal and bone safety profile.[61]

34. This study concluded by noting that, "[w]ith the advent of TAF, we move closer towards being able to select regimens designed for life-long use, which could help to achieve minimum toxic effects and maximum adherence."[62]

C. Quantitative Analysis Shows that TAF Is Preferred Over TDF by Patients.

35. Consistent with the above discussion, I found that TAF-based drugs are preferred over TDF-based drugs by patients. To see this, I performed a revealed preference analysis of the number of prescriptions filled of TDF-based drugs and TAF-based drugs following TAF's FDA approval in 2015. **Figure 1**: *Prescriptions Filled of TDF-Based and TAF-Based Medications, 2001-2022*, below, shows the total number of prescriptions of each type of drug prescribed to Missouri patients. Overall

States." *Teva Pharmaceutical Industries Ltd.* (Dec. 15, 2017). <https://www.tevapharm.com/news-and-media/latest-news/teva-announces-exclusive-launch-of-generic-viread-in-the-united-states> (accessed Nov. 14, 2024).

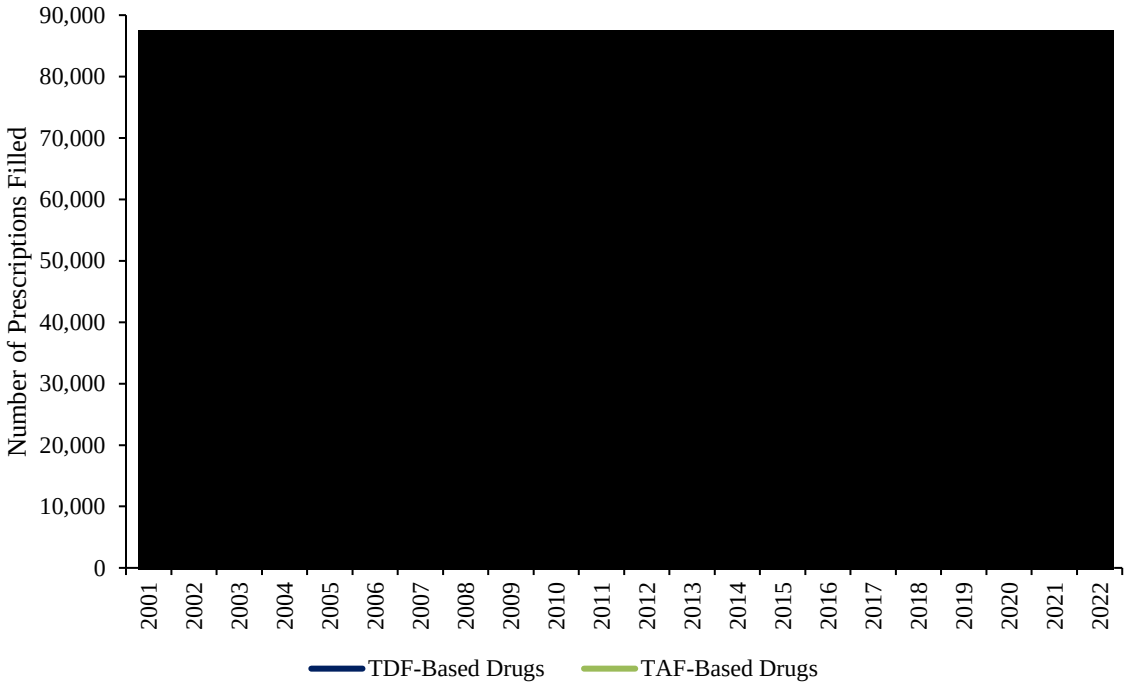
[60] Aloy, Blandine, et al. "Is Tenofovir Alafenamide Safer than Tenofovir Disoproxil Fumarate for the Kidneys?" *Aids Reviews* 18.4 (2016): 184-192.

[61] Antela, A., et al. "The Role of Tenofovir Alafenamide in Future HIV Management." *HIV Medicine* 17 (2016): 4-16 at 8.

[62] Antela, A., et al. "The Role of Tenofovir Alafenamide in Future HIV Management." *HIV Medicine* 17 (2016): 4-16 at 13.

demand for TDF-based drugs had cratered within just a few years after the introduction of TAF-based drugs to the market.

Figure 1: *Prescriptions Filled of TDF-Based and TAF-Based Medications, 2001-2022*[63]



36. Using an analysis of patients' revealed preferences demonstrates that TAF-based drugs are preferred over TDF-based drugs by patients. In economics, revealed preference analysis is based on the result that consumers' actual choices in a market setting reveal their true preferences when faced with different options and constraints.[64] In this case, patients' rapid switching behavior from TDF- to TAF-based medications reveals their strong preference for TAF.[65]

[63] "CDS.ZXPF.CLIENT.OUTPUT.2001-2005"; "CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023." The IQVIA data used in this analysis contains data on prescriptions through June 2023. I reserve the right to update these figures based on any additional information or data that becomes available to me. The measure of TDF-based drugs includes both generic and branded formulations. All data on TDF-based drugs in this report exclude Viread powder, a rarely used formulation lacking any generic forms or TAF equivalent forms.

[64] Varian, Hal R. *Intermediate Microeconomics, Eighth Edition*. New York: W. W. Norton & Company (2010) at 118-121 ("[T]he essential point [of revealed preference] is clear: if we observe that one bundle is chosen when another one is affordable, then we have learned something about the preferences between the two bundles: namely, that the first is preferred to the second.").

[65] Moreover, once patients switched, they appeared to persist with that choice. [redacted]

37. Such a revealed preference analysis is particularly compelling because it shows patients' preferences through their actual market behavior rather than stated preferences in surveys or hypothetical scenarios. For example, survey-based measurement techniques such as conjoint analysis are sometimes used to attempt to estimate consumer preferences in situations where data may not exist on actual choices and thus there is not a suitable real-world benchmark.[66] On the contrary, revealed preference analysis is based on actual consumer choices and outcomes, that is, it relies on actual sales and consumption of the drugs and is not self-reported or speculative. As such, it provides a more reliable measure of consumer preferences and behavior than other methods such as stated preference analysis or surveys with conjoint analysis.[67] Revealed preference analysis also has advantages over other methods such as hedonic regression. For instance, a revealed preferences method directly examines actual consumer choices in the market, allowing it to capture the full scope of decision-making, including preferences and attributes that may not be fully explained by a handful of product characteristics included in a hedonic regression.

38. In this matter, revealed preference analysis indicates that patients valued the benefits of TAF (including reduced side effect risks) more than the additional amount TAF cost, as evidenced by the fact that most patients switched away from TDF-based drugs to TAF-based drugs even when those TAF-based drugs were more expensive. Moreover, even with the introduction of generic TDF-based drugs, which offered a significantly lower-cost alternative, patients overwhelmingly continued to choose TAF-based medications (see below). This reveals that patients genuinely preferred TAF's characteristics over TDF.

39. Importantly, the structure of the market was unchanged when Gilead released TAF to the market. That is, the market consisted of largely the same prescribers and patients, diagnosed with the same

[redacted] Eid, Albert J. Deposition (Aug. 18, 2023) ("Eid Dep.") 91:10-20.

[66] Al-Omari, Basem, et al. "Conjoint Analysis: A Research Method to Study Patients' Preferences and Personalize Care." *Journal of Personalized Medicine* 12 (2022): 1-14.

[67] *See* Quaife, Matthew, et al. "How Well Do Discrete Choice Experiments Predict Health Choices? A Systematic Review and Meta-Analysis of External Validity." *The European Journal of Health Economics* 19 (2018): 1053-1066 at 1053 ("Disparities between revealed and stated preference data are, in part, due to the hypothetical nature of [discrete choice experiment] tasks; this divergence is termed hypothetical bias."), 1063 ("There may be some reasons why observed choices may be different to those predicted by [discrete choice experiments]. Firstly, the information presented in DCE choice tasks is necessarily a simplification of reality. Even in the case of high-quality DCEs, there are likely to be unobserved attributes present in real-life decisions that were not, or poorly, accounted for in the DCE. Where these unobserved attributes influence the decisions of participants, stated and revealed preferences will be based on heterogeneous choice attributes and may diverge. Even high-quality DCEs are unlikely to fully capture all relevant attributes of choice.").

disease,[68] with the same concerns and preferences with respect to safety, efficacy, and possible side effects, all of whom were utilizing the same pharmacies when faced with the decision to (possibly) switch medications. The only relevant change upon the introduction of TAF was the new availability of an additional substitute (TAF) in the market, alongside the additional information that became known about TAF's safety profile. Patients' revealed preference for TAF over TDF is therefore directly related to TAF's characteristics, i.e., efficacy and safety relative to TDF, rather than any other market dynamics.

40. Substituting from TDF-based drugs to TAF-based drugs is unsurprising given the differences in efficacy and side-effects between the two compounds, as I discussed above. A 2019 study on "[s]witching strategies in the recent era of antiretroviral therapy" listed TAF as a "[s]uggested switch" from TDF.[69] The study reported that switches "[f]rom TDF-containing regimens to TAF-containing regimens" should be considered due to TAF's superior "bone and renal tolerability" and "side effects such as worsening of renal function and bone mineral density alterations … in patients receiving a TDF-containing regimen."[70]

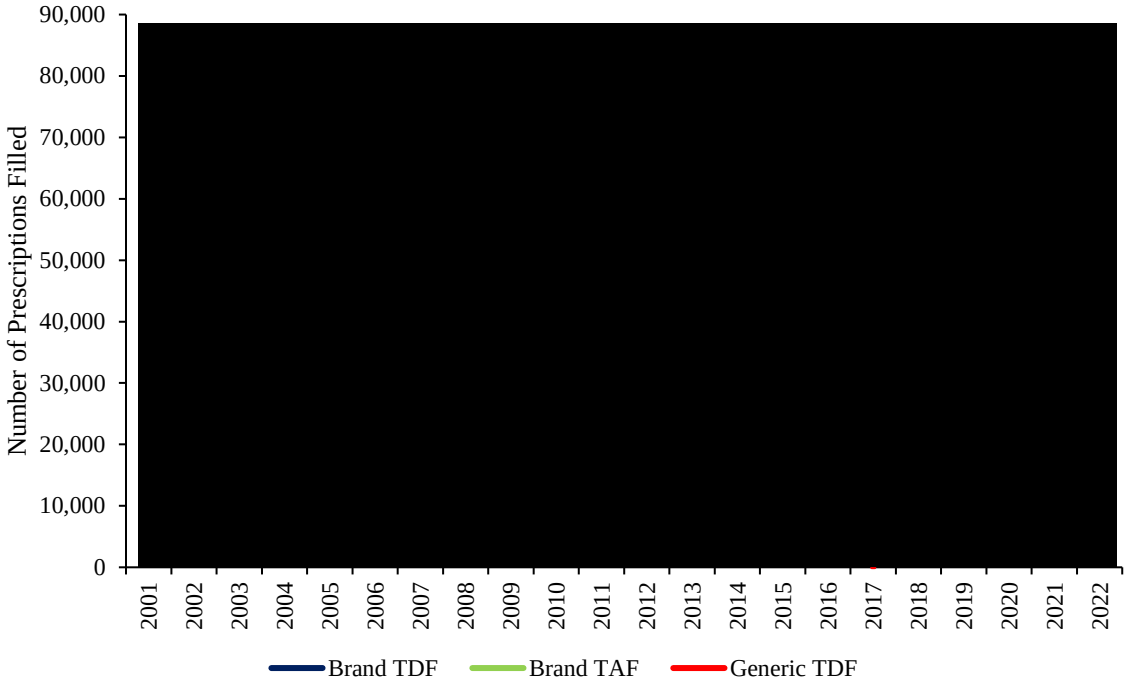
41. That some patients continued to use TDF-based drugs following the introduction of TAF-based drugs to the market may be largely driven by differences in price, combined with inertia in medical decision-making, discussed further below. As shown below in **Figure 2**: *Retail and Generic Prescriptions Filled of TDF-Based and TAF-Based Medications, 2001-2022*, the introduction of TAF-based drugs to the market closely coincided with the introduction of generic TDF-based drugs. Moreover, it is striking that [redacted]

[68] While the overall prevalence of individuals living with HIV has been continuously increasing as new infections occur, the rate of new HIV diagnoses has held relatively steady and did not exhibit any dramatic increases or unusual activity around the time that TAF drugs were released. *See* "HIV Diagnoses, Missouri, 2015." *CDC Atlas Plus*. <https://gis.cdc.gov/grasp/nchhstpatlas/charts.html> (accessed Dec. 17, 2024); "HIV Prevalence, Missouri, 2015." *CDC Atlas Plus*. <https://gis.cdc.gov/grasp/nchhstpatlas/charts.html> (accessed Dec. 17, 2024). As HIV is not presently curable and requires continuous medication therapy, all patients living with HIV before the release of TAF drugs would continue to require HIV medications in the following years. *See* "HIV Treatment Adherence." *HIVinfo.NIH.gov* (Aug. 12, 2021). <https://hivinfo.nih.gov/understanding-hiv/fact-sheets/hiv-treatment-adherence> (accessed Dec. 17, 2024).

[69] Prieto, Paula and Daniel Podzamczer. "Switching Strategies in the Recent Era of Antiretroviral Therapy." *Expert Review of Clinical Pharmacology* 12.3 (2019): 235-247 at 237.

[70] Prieto, Paula and Daniel Podzamczer. "Switching Strategies in the Recent Era of Antiretroviral Therapy." *Expert Review of Clinical Pharmacology* 12.3 (2019): 235-247 at 235, 241.

Figure 2: *Retail and Generic Prescriptions Filled of TDF-Based and TAF-Based Medications, 2001-2022*[71]



42. Economic analysis makes clear that Gilead's branded TDF was not preferred to TAF or generic TDF. [redacted]

[71] "CDS.ZXPF.CLIENT.OUTPUT.2001-2005"; "CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023." The IQVIA data used in this analysis contains data on prescriptions through June 2023. I reserve the right to update these figures based on any additional information or data that becomes available to me.

Table 3: *Market Share of Branded TDF, Branded TAF, and Generic TDF, 2015-2023*[72]

Year	Branded TDF Market Share	Branded TAF Market Share	Generic TDF Market Share
2015	[redacted]		
2016			
2017			
2018			
2019			
2020			
2021			
2022			
2023			

43. As such, the substitution patterns between branded TDF, generic TDF, and branded TAF differ from what one might consider typical generic entry dynamics in pharmaceutical markets. For instance, research has found that when branded drugs face generic competition, there is typically some amount of expected price reductions as competition induces patients to switch to the generic version of the same molecule rapidly and pay lower prices.[73] For example, one study found that prices for specialty oral cancer medication fell by 25 to 26 percent following the introduction of generics.[74] In contrast, in this instance, patients generally switched from the cheaper TDF-based drugs to the more expensive TAF-based drugs, revealing that they valued its therapeutic benefits more than the cost savings available from generic TDF. The willingness of patients to pay premium prices for TAF when cheaper generic TDF was available provides strong support that this is not merely a case of normal market dynamics around generic entry.

44. This substitution pattern is also present for "head-to-head" comparisons between TDF-based and TAF-based drugs. [redacted]

[72] To calculate market share, I use the measure of new prescriptions from the IQVIA data produced in this action. "CDS.ZXPF.CLIENT.OUTPUT.2001-2005"; "CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023." The IQVIA data used in this analysis contains data on prescriptions through June 2023. I reserve the right to update these figures based on any additional information or data that becomes available to me.

[73] *See* Rome, Benjamin, et al. "Factors Associated with Generic Drug Uptake in the United States, 2012 to 2017." Health Policy Analysis 24.6 (2021): 804-811 at 804 ("In the United States, brand-name prescription drugs remain expensive until market exclusivity ends and lower-cost generics become available. … Mean generic uptake was 66.1% (standard deviation 22.1%) in the first year and 82.7% (standard deviation 21.6%) in the second year after generic entry.").

[74] Conti, Rena M. and Ernst R. Berndt. "Specialty Drug Prices and Utilization After Loss of U.S. Patent Exclusivity, 2001-2007." *Measuring and Modeling Health Care Costs*. Eds. Ana Aizcorbe, Colin Baker, Ernst R. Berndt and David M. Cutler. Chicago: University of Chicago Press for the National Bureau of Economic Research (2018).

[redacted][75]

Table 4: *Prescriptions of Complera vs Odefsey, 2011-2023*[76]

Year	Complera (TDF)		Odefsey (TAF)	
	Total Prescription	Market Share	Total Prescription	Market Share
2011	[redacted]			
2012				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				

45. A similar pattern exists for other "head-to-head" comparisons, as can be seen in **Table 5**: *Prescriptions of Truvada vs Descovy, 2004-2023* and **Table 6**: *Prescriptions of Stribild vs Genvoya, 2012-2023*, below. [redacted][77]

[75] The total market in this market share analysis is all prescriptions of Complera and Odefsey combined.
[76] "CDS.ZXPF.CLIENT.OUTPUT.2001-2005"; "CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023." The IQVIA data used in this analysis contains data on prescriptions through June 2023. I reserve the right to update these figures based on any additional information or data that becomes available to me.
[77] The total market in these market share analyses is all prescriptions of Truvada and Descovy combined and all prescriptions of Stribild and Genvoya combined, respectively.

Table 5: *Prescriptions of Truvada vs Descovy, 2004-2023*[78]

Year	Truvada (TDF)		Descovy (TAF)	
	Total Prescription	Market Share	Total Prescription	Market Share
2004	[redacted]			
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				

[78] "CDS.ZXPF.CLIENT.OUTPUT.2001-2005"; "CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023." The IQVIA data used in this analysis contains data on prescriptions through June 2023. I reserve the right to update these figures based on any additional information or data that becomes available to me.

Table 6: *Prescriptions of Stribild vs Genvoya, 2012-2023*[79]

Year	Stribild (TDF)		Genvoya (TAF)	
	Total Prescription	Market Share	Total Prescription	Market Share
2012	[redacted]			
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				

46. Furthermore, this analysis likely understates the true extent of patient preference for TAF over TDF due to medical inertia in prescription drug choices. Medical inertia refers to the tendency of patients and healthcare providers to continue existing treatments even when superior alternatives become available.[80] This inertia arises from multiple factors including familiarity with current treatments, concerns about switching costs, and general risk aversion in medical decision-making.[81] [redacted]

[79] "CDS.ZXPF.CLIENT.OUTPUT.2001-2005"; "CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023." The IQVIA data used in this analysis contains data on prescriptions through June 2023. I reserve the right to update these figures based on any additional information or data that becomes available to me.

[80] *See* Andreozzi, F., et al. "Clinical Inertia Is the Enemy of Therapeutic Success in the Management of Diabetes and Its Complications: A Narrative Literature Review." *Diabetology & Metabolic Syndrome* 12 (2020): 1-11 at 1 ("The phenomenon of clinical inertia is defined as the failure to start a therapy or its intensification/non-intensification when appropriate[.]"); Sheehan, John J., et al. "Real-World Assessment of Treatment Inertia in the Management of Patients Treated for Major Depressive Disorder in the USA." *Journal of Comparative Effectiveness Research* (2023): 1-10 at 2 ("Treatment inertia [is] defined as not modifying treatment when treatment goals have not been met[.]").

[81] *See, e.g.,* [redacted]; Janssen, Aljoscha. "Generic and Branded Pharmaceutical Pricing: Competition Under Switching Costs." *The Economic Journal* 133 (2023): 1937-1967 (analyzing switching costs as a barrier to changing from branded to generic drugs).

[redacted]"[83]

47. Therefore, the observed preference for TAF during the analyzed period should be viewed as a lower bound on consumers' true preferences for TAF over TDF.[84] A less conservative estimate would account for the dampening effect of medical inertia by examining patterns among patient populations less affected by inertia, such as newly diagnosed patients.

48. Gilead has written in a legal document for a different case about the importance of patients receiving the "genuine, life-saving medication that he or she was prescribed[.]"[85] But-for Gilead's deceptions and withholding of TAF, the majority of consumers' prescriptions during the Class Period would have been for a TAF-based medication instead of a TDF-based medication charged at historical TDF prices, as demonstrated by the preceding analysis. Given Gilead's representations elsewhere, Gilead can hardly claim that receiving the best, most clinically appropriate prescription for one's situation is not important, indeed vital, for patients.

V. THERE EXISTS A CLASS-WIDE METHODOLOGY FOR CALCULATING THE LOST BENEFIT OF THE BARGAIN THAT CLASS MEMBERS EXPERIENCED DUE TO GILEAD'S ALLEGED MISCONDUCT.

49. In this section, I show that there exists a class-wide methodology to calculate damages attributable to Gilead's misconduct during the Class Period which deprived Class Members of the benefit of the bargain from purchasing TDF-based drugs. The methodology described herein is common to all class-members, and relies on a common set of documents, data, and facts.[86]

---

[82] Zinser Dep. 92:11-93:21.
[83] Zinser Dep. 93:3-5.
[84] In addition, the late approval of TAF-based therapies for certain use cases like PrEP or usage in pregnant women means that aggregate data would further understate consumers' true preference for TAF over TDF. *See* Highleyman, Liz. "US FDA Approves TAF-Based PrEP for Many People at Risk for HIV." *Aidsmap* (Oct. 7, 2019). <https://www.aidsmap.com/news/oct-2019/us-fda-approves-taf-based-prep-many-people-risk-hiv> (accessed Dec. 10, 2024) (reporting on the first TAF-based approval for PrEP in 2019); Eke, Ahizechukwu C., et al. "Tenofovir Alafenamide Use in Pregnant and Lactating Women Living with HIV." *Expert Opinion on Drug Metabolism & Toxicology* 16.4 (2020): 333-342 at 333 ("Initial pregnancy data suggest that TAF-based FDCs have high efficacy and low risk of adverse effects during pregnancy. TAF is likely to become part of first-line regimens for use in pregnant women living with HIV once additional pregnancy data from phase III trials are available.").
[85] Victim Impact Statement of Gilead Sciences, Inc., Gilead Sciences Ireland UC, and Gilead Sciences, LLC. *United States of America v. Edvin Ovasapyan, et al.* (N.D. Cal. No. 3:18-cr-533-RS) (Nov. 4, 2024) at 7.
[86] All dollar figures are in real, not nominal, January 2024 dollars, adjusting for the change in prices as measured by the consumer price index. "Consumer Price Index for All Urban Consumers: All Items in U.S. City Average (CPIAUCSL)." *FRED*. <https://fred.stlouisfed.org/series/CPIAUCSL> (accessed Dec. 10, 2024).

50. I understand from counsel that the Class Period covers the time during which TAF could have been available to the market, but was not due to Gilead's actions.[87] I also understand from counsel that, under applicable laws in this matter, damages to consumers/purchasers are calculated as the lost benefit of the bargain, which is the difference between the value of the product as represented and the actual value of the product received. As this court explained, "Missouri courts apply the 'benefit of the bargain rule' when determining if plaintiff has suffered an ascertainable loss. … This rule awards a purchaser the difference between the value of the product as represented and the actual value of the product received."[88]

51. Gilead's misconduct deprived patients/consumers of the benefit of the bargain by misrepresenting the safety and efficacy of TDF-based drugs. As a result of these misrepresentations, patients and their doctors believed that the value of prescribing and purchasing TDF-based drugs was greater than the actual value.

52. From an economics perspective, this means that, had Gilead provided accurate information regarding TDF and TDF-based drugs, consumers drugs would have had a lower willingness to pay for (demand) TDF-based drugs, resulting in a lower price for those drugs. This is because the demand for drugs in general, and TDF-based drugs in particular, depends positively on the efficacy of those drugs and the number of patients with relevant conditions to be treated, but negatively on the presence of side-effects. As I discussed in detail above in Section IV, that is precisely the situation that occurred with TDF-based drugs, with Gilead hiding that TDF was associated with an increase in adverse side effects, while simultaneously downplaying and delaying the safer, comparably effective TAF drugs.

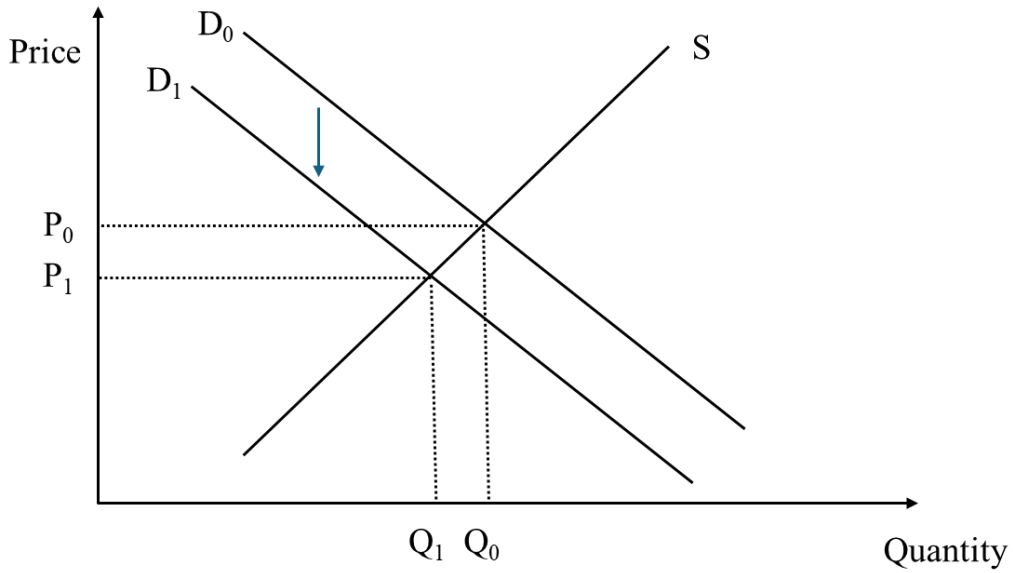
[87] My damages methodology is robust to any changes in the dates relevant Class Period. I reserve the right to update the time period covered by my damages analysis should I be asked to do so or should a fact finder reach a determination as to the dates during which TAF could have been available to the market but-for Gilead's actions.

[88] Memorandum and Order. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Doc. 18) (Sept. 28, 2021) at 11.
Plubell v. Merck & Co., Inc., 289 S.W.3d 707, 715 (Mo. Ct. App. 2009) ("The trial court found they had alleged an ascertainable loss under the benefit-of-the-bargain rule, which compares the actual value of the item to the value of the item if it had been as represented at the time of the transaction. … The rule is part of our standard instructions for damages in misrepresentation cases. *See* MAI 4.03. The rule is also applicable in MMPA cases to meet the element of ascertainable loss.").

53. The supply curve for TDF-based drugs, on the other hand, is determined by Gilead's cost of manufacturing TDF-based drugs during the Class Period.[89] The supply curve of TDF-based drugs would be unaffected in a world in which Gilead had not misrepresented TDF's safety and efficacy.

54. This situation is illustrated below in the supply and demand curves in **Figure 3**: *Supply and Demand for TDF-Based Drugs*. The demand curve labeled D_0 shows patient demand for TDF-based drugs in which Gilead's misconduct led to an overly positive view of the benefits (or insufficiently pessimistic view of the side effects and complications) of TDF-based drugs. In contrast, the demand curve labeled D_1 shows patient demand for TDF-based drugs in the but-for world in which patients were fully informed of the costs and benefits of TDF-based drugs. Finally, the supply curve, labeled *S*, reflects Gilead's cost of producing TDF-based drugs, which is the same in both the real world and the but-for world.

Figure 3: *Supply and Demand for TDF-Based Drugs*



55. Economic principles dictate that the market price will be where the demand curve intersects with the supply curve. Referring to the supply and demand figure, that means that the equilibrium price in the real world is P_0 and patients buy Q_0 units of TDF-based drugs. Economic analysis shows the impact

[89] Mankiw, N. Gregory. *Principles of Microeconomics, Fifth Edition*. Mason, Ohio: South-Western Cengage Learning (2009) at 164 ("[R]ecall[] that … the supply curve reflects the costs of producers."), 268 ("As we will see in the coming chapters, a firm's costs are a key determinant of its production and pricing decisions.").

of revealing Gilead's misconduct to the public; the demand curve falls to D_1, resulting in a lower price, P_1.

56. To summarize, when Gilead presented an overly rosy picture of TDF's safety and delayed the availability of TAF, demand was artificially higher than it would have been absent those misrepresentations, which led to a higher price in market equilibrium.

57. This analysis makes clear that damages attributable to the lost benefit of the bargain to consumers due to Gilead's misconduct can be calculated as the difference between: (i) P_0, the price that Class Members paid for TDF-based drugs and (ii) P_1, the price that they would have paid, multiplied by (iii) Q_0,[90] the number of prescriptions purchased by Class Members, or,

$$Damages = (P_0 - P_1) * Q_0.$$ [91]

58. To calculate damages for Class Members, then, requires identifying P_0, P_1, and Q_0, that is, the price that Class Members paid for TDF-based drugs, the price they would have paid absent Gilead's misconduct, and the number of prescriptions sold. I now turn to discuss how each of these can be calculated on a class-wide basis.

A. P_0: Retail Price for TDF-Based Drugs

59. P_0 is the price that Class Members paid for TDF-based drugs, or, in other words, the retail price for those same drugs. I note that this retail price is the price *charged* to all consumers, regardless of their health care plan.[92, 93]

60. Notably, retail prices reflect the final market outcome, and thus incorporate the economic incentives and decisions of all relevant market participants, including manufacturers, wholesalers, pharmacy benefit managers ("PBMs"), pharmacies, insurers, and patients. As such, analyzing retail prices avoids many of the measurement challenges that can occur in analyzing pharmaceutical markets. A

[90] While the equilibrium quantity of prescriptions of TDF-based drugs might have also fallen had Gilead not misrepresented the efficacy and safety of TDF (i.e., $Q_0 > Q_1$), it is sufficient to analyze Q_0 in assessing the lost benefit of the bargain, as that reflects the number of patients who *actually* purchased TDF-based drugs.
[91] I note that this is a conservative estimate of damages, since the individuals purchasing TDF based products between Q_0 and Q_1 actually suffered a loss equal to the full triangle found under the supply curve and above D_1 across those units. My description of damages only captures a portion of that triangle.
[92] The retail price also equals the price paid by customers whose out-of-pocket payment covers the full cost of the drug (i.e., cash customers). Information on the price paid by cash customers is available, for example, from CVS's pharmacy purchase records produced for this case.
[93] I note that it is straightforward to modify the damages methodology described herein to exclude those customers who paid zero dollars out-of-pocket to acquire TDF-based drugs.

retail price methodology effectively addresses these complications because it represents the final market equilibrium price that emerges from the interactions of all market participants.[94]

61. The reliability of retail prices is supported by economic theory. In markets, retail prices represent the intersection of supply and demand, incorporating all relevant market information and constraints.[95] Using retail prices also fits with benefit of the bargain damages because it captures the market value that was charged versus the market value that would have been charged absent the alleged misconduct. This approach provides a clear, objective measure of damages, can be consistently applied across the class, relies on observable market data, and captures the full economic impact of Gilead's actions. I understand from counsel that under the legal framework guiding this case the Class Member were entitled to the full, as-represented market value of the TDF-based drugs they received, so it is not necessary for me to subdivide the full retail price to account for such things as negotiated discounts between manufacturers, PBMs, third-party payors, or retail pharmacies or copayments for insured patients.

62. I propose two alternative approaches that can be reliably used to measure the retail price of TDF-based drugs that Class Members paid during the Class Period.

63. In the first approach, I calculate a reasonable estimate of the retail price for the TDF-based drugs by calculating what the Missouri state Medicaid reimbursement rate for those TDF-based drugs would have been during the Class Period. During the Class Period, Missouri's Medicaid program reimbursed for drugs according to specific benchmark formulas, including a benchmark of the drug's stated WAC plus 10 percent.[96, 97] I can thus perform a reasonable analysis of the retail price for TDF-

---

[94] *See* "Prescription Drugs: Spending, Use, and Prices." *Congressional Budget Office* (Jan. 2022). <https://www.cbo.gov/system/files/2022-01/57050-Rx-Spending.pdf> (accessed Dec. 13, 2024) at 6 ("The retail price of a drug at the pharmacy counter is determined by negotiations between pharmacies and insurers (or their PBMs) and reflects both wholesale and retail markups. Those markups compensate the wholesaler and pharmacy, respectively, for the services they provide and for their inventory costs. The retail price of a given drug is probably similar for most payers.").

[95] Mankiw, N. Gregory. *Principles of Microeconomics, Fifth Edition*. Mason, Ohio: South-Western Cengage Learning (2009) at 77-78 (discussing that at a competitive market's equilibrium price, or the price at the intersection of the supply and demand curves, "the quantity of the good that buyers are willing and able to buy exactly balances the quantity that sellers are willing and able to sell." In a competitive market, the market price is pushed towards the equilibrium price due to the law of supply and demand).

[96] 13 CSR 70-20.070 (Dec. 31, 2002); 13 CSR 70-20.070 (June 30, 2007); 13 CSR 70-20.070 (Feb. 28, 2014).

[97] I note that, although the WAC benchmarks described set possible reimbursement rates for drugs paid for under Missouri Medicaid, the actual reimbursement rate is generally required to be equal to the lowest of available benchmarks, including the pharmacy's usual and customary charge. While I reserve the right to consider these alternative benchmarks at the merits stage of this matter, the use of such alternative benchmarks would not alter my conclusions as to the existence of a class-wide damages methodology that shows that Gilead's misconduct deprived Class Members of the benefit of the bargain.

based drugs by taking each TDF-based drug's WAC and multiplying by 10 percent to arrive at its statutory Medicaid reimbursement rate.

64. Data on the WAC for these TDF-based drugs during the Class Period was available to me from discovery in this matter.[98] **Table 7**: *Summary of WAC and Missouri Reimbursement Rates for TDF-Based Drugs, 2003-2015*, below, shows the average summary statistics for both the WAC that Gilead charged wholesalers for TDF-based drugs as well as the calculated Missouri reimbursement rate for TDF-based drugs for a one-month prescription.

[98] Defendant Gilead Sciences, Inc.'s Objections and Response to Plaintiffs' Second Set of Interrogatories. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Aug. 30, 2023) at Appendix A, Appendix B.

Table 7: *Summary of WAC and Missouri Reimbursement Rates for TDF-Based Drugs, 2003-2015*[99]

TDF Drug	Year	Average WAC	Missouri Reimbursement Rates
ATRIPLA	2006	[redacted]	
	2007		
	2008		
	2009		
	2010		
	2011		
	2012		
	2013		
	2014		
	2015		
COMPLERA	2011		
	2012		
	2013		
	2014		
	2015		
STRIBILD	2012		
	2013		
	2014		
	2015		
TRUVADA	2004		
	2005		
	2006		
	2007		
	2008		
	2009		
	2010		
	2011		
	2012		
	2013		
	2014		
	2015		
VIREAD	2003		
	2004		
	2005		
	2006		
	2007		

[99] The WAC data produced in this matter contains information on each drugs' annual WAC, that is, the WAC price for 365 doses. The monthly WAC figures in this table is the annual WAC price divided by 12. Defendant Gilead Sciences, Inc.'s Objections and Response to Plaintiffs' Second Set of Interrogatories. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Aug. 30, 2023) at Appendix A, Appendix B. Figures reported in 2024 dollars.

2008	[redacted]
2009	
2010	
2011	
2012	
2013	
2014	
2015	

65. Gilead has represented in another court that it "sells each of [its HIV] medications at a single [WAC] price" that "does not change from distributor to distributor, so Gilead earns revenue equal to the WAC price for every bottle sold."[100] Thus, using the WAC price as a base price is supported, according to Gilead's own statements.

66. For my second approach, I estimate the retail price that customers were charged by using the following steps: (i) identify the wholesale acquisition cost ("WAC") for those drugs; (ii) adjust for rebates that Gilead paid to wholesalers; (iii) adjust for wholesaler markups; and (iv) adjust for the average dispensing fee for Missouri pharmacies and other pharmacy markups. I discuss each of these in turn.

67. Just as in the first approach, data on the WAC for these TDF-based drugs during the Class Period was available to me from discovery in this matter.[101] However, the WAC is not typically the actual price that Gilead charged wholesalers, because it is common practice for pharmaceutical companies to give wholesalers rebates. In turn, the actual price paid by wholesalers is often substantially below the reported WAC price.[102] Gilead follows this common practice, often rebating billions of dollars to wholesalers.[103] To calculate the typical rebate that Gilead gave wholesalers who purchased its

[100] Victim Impact Statement of Gilead Sciences, Inc., Gilead Sciences Ireland UC, and Gilead Sciences, LLC. *United States of America v. Edvin Ovasapyan, et al.* (N.D. Cal. No. 3:18-cr-533-RS) (Nov. 4, 2024) at 6.
[101] Defendant Gilead Sciences, Inc.'s Objections and Response to Plaintiffs' Second Set of Interrogatories. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Aug. 30, 2023) at Appendix A, Appendix B.
[102] *See* Fein, Adam J. "Building a New Drug Wholesaler Compensation Model: What Happens as Brand Inflation Slows?" *Drug Channels* (July 24, 2018). <https://www.drugchannels.net/2018/07/building-new-drug-wholesaler.html> (accessed Dec. 17, 2024); Seeley, Elizabeth. "The Impact of Pharmaceutical Wholesalers on U.S. Drug Spending." *The Commonwealth Fund* (July 20, 2022). <https://www.commonwealthfund.org/publications/issue-briefs/2022/jul/impact-pharmaceutical-wholesalers-drug-spending> (accessed Nov. 22, 2024).
[103] For instance, in its 2015 10-K SEC filing, Gilead stated that its gross product sales were reduced by $16.4 billion due to "government and other rebates and chargebacks" and by another $1.7 billion due to "cash discounts for prompt payment, distributor fees, and other related costs." Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2015) at 49.

product, I reviewed a set of Gilead's 10-K filings and identified Gilead's stated total "gross-to-net reduction" in its product sales, as shown below in **Table 8**: *Gilead's Reported Rebates, 2012-2023*.

Table 8: *Gilead's Reported Rebates, 2012-2023*

Fiscal Year	Total Gross-to-Net Deduction	Total Gross-to-Net Deduction (%)
2012	$3,100,000,000	25%
2013	$3,900,000,000	26%
2014	$7,300,000,000	23%
2015	$18,100,000,000	36%
2016	$20,300,000,000	40%
2017	$17,200,000,000	40%
2018	$16,500,000,000	43%
2019	$15,300,000,000	41%
2020	$15,300,000,000	39%
2021	$14,373,000,000	35%
2022	$14,582,000,000	35%
2023	$16,400,000,000	38%

68. To calculate the relevant rebate percentage during the Class Period, I analyzed the average rebates Gilead paid from 2012 through 2015,[104] and found that this figure was 27.5 percent. Accordingly, I adjusted the WAC price for TDF-based drugs downwards by 27.5 percent to arrive at a "Rebate-Adjusted WAC" price for each at-issue drug.

69. The rebates that Gilead paid wholesalers lowered the stated WAC price. However, in taking products to retail pharmacies, wholesalers regularly markup above the price they paid to purchase drugs. In other words, the Rebate-Adjusted WAC must be adjusted upwards to account for the markup that wholesalers apply when selling drugs to pharmacies. However, for branded products (such as the TDF-drugs at issue here), it is a matter of economics (and corroborated by industry sources) in the pharmaceutical market that wholesalers are generally price takers for brand drugs.[105] For instance, a

[104] Gilead did not report detailed information on the level or percent of rebates in its SEC filings prior to 2012. I reserve the right to update these calculations should additional information on Gilead's rebates become available to me.

[105] Seeley, Elizabeth. "The Impact of Pharmaceutical Wholesalers on U.S. Drug Spending." *The Commonwealth Fund* (July 20, 2022). <https://www.commonwealthfund.org/publications/issue-briefs/2022/jul/impact-pharmaceutical-wholesalers-drug-spending> (accessed Nov. 22, 2024) ("In most branded-drug markets, wholesalers act as price-takers, often selling at the same discount off WAC that they buy at, such as WAC minus 5 percent. In branded-drug markets in which wholesalers have little influence over price, as may be the case with limited-

study by Neeraj Sood and coauthors found that the wholesalers' markup, as measured by wholesalers' brand drug gross margins,[106] is around one percent.[107] Accordingly, I conservatively apply a one percent markup to the Rebate-Adjusted WAC to calculate the pharmacy's expected acquisition price for the at-issue drugs.[108]

70. Finally, I adjusted for the average dispensing fee at Missouri pharmacies throughout the Class Period. Dispensing fees are "amount[s] reimbursed to the pharmacy to cover the charge for professional services and overhead costs[.]"[109] To be conservative, I use the dispensing fees mandated by Missouri's state health system,[110] which are generally considered to underestimate the true cost and associated markup to dispense a prescription.[111] Missouri rulemaking set this fee by

---

distribution drugs, they may derive some revenue from selling at a higher price than they purchased, such as buying at WAC minus 5 percent and selling at WAC minus 3 percent."); Fein, Adam J. "Drug Wholesalers and Brand-Name Drug Prices: Understanding CVS Health/McKesson and Why Pharmacies Lose Money on GLP-1s." *Drug Channels* (Dec. 5, 2023). <https://www.drugchannels.net/2023/12/drug-wholesalers-and-brand-name-drug.html> (accessed Nov. 22, 2024) ("For example, 'cutting out the middleman' … often makes little sense for brand-name drugs. That's because large-volume buyers negotiate with drug wholesalers to capture buy-side discounts and fees that brand manufacturers offer only to the wholesale class of trade. Even the largest mail pharmacies and self-warehousing retail chains buy brand-name drugs from a wholesaler instead of directly from the manufacturer. For smaller pharmacies, wholesalers' sell-side discounts for brand-name drugs are typically linked to generic purchases. Consequently, smaller pharmacies have historically purchased brand-name drugs at costs that are only slightly higher than those of the largest pharmacies.").

[106] The study measured gross profits as "revenues received primarily from pharmacies less payments made primarily to manufacturers." I use the measure to most accurately isolate the wholesaler markup relative to the net price charged by Gilead. *See* Sood, Neeraj, et al. "The Flow of Money Through the Pharmaceutical Distribution System." *Schaeffer Center White Paper Series* (June 2017). <https://healthpolicy.usc.edu/wp-content/uploads/2017/06/The-Flow-of-Money-Through-the-Pharmaceutical-Distribution-System_Final_Spreadsheet.pdf> (accessed Nov. 22, 2024) at 3.

[107] Sood, Neeraj, et al. "The Flow of Money Through the Pharmaceutical Distribution System." *Schaeffer Center White Paper Series* (June 2017). <https://healthpolicy.usc.edu/wp-content/uploads/2017/06/The-Flow-of-Money-Through-the-Pharmaceutical-Distribution-System_Final_Spreadsheet.pdf> (accessed Nov. 22, 2024) at 5.

[108] This approach is conservative because the ability of any wholesaler to markup prices by more than just one percent would increase the resulting retail price that patients face at the pharmacy.

[109] Mattingly, Joey. "Understanding Drug Pricing." *US Pharmacist* 37.6 (2012): 40-45 at Table 1.

[110] Other sources for dispensing costs are available which may also be used in lieu of the Medicaid mandated dispensing fee adjustment. *See, e.g.*, Shoemaker-Hunt, Sarah, et al. "Cost of Dispensing Study." *Abt Associates* (Jan. 2020). <https://www.nacds.org/pdfs/pharmacy/2020/NACDS-NASP-NCPA-COD-Report-01-31-2020-Final.pdf> (accessed Dec. 6, 2024); "The Cost of Dispensing Study." *Coalition for Community Pharmacy Action* (Aug. 2015). <https://ncpa.org/sites/default/files/pdf/mpi_cod_2015.pdf> (accessed Dec. 6, 2024). My class-wide damages methodology would remain unchanged if another source of dispensing fee data were to be used, and I reserve the right to do so should new information become available to me.

[111] *See, e.g.*, Salazar, David. "Study: Mo. Dispensing Costs Rise to $13 Per Prescription." *Drug Store News* (Oct. 15, 2025). <https://drugstorenews.com/pharmacy/study-mo-dispensing-costs-rise-1-prescription> (accessed Dec. 6, 2024) ("A new study by the University of Missouri-Kansas City and St. Louis College of Pharmacy is finding that dispensing costs at community pharmacies averaged $12.99 per prescription in 2014 — a number that's far higher than the Mo. Medicaid reimbursement of $4.09 per prescription."); Shoemaker-Hunt, Sarah, et al. "Cost of Dispensing Study." *Abt Associates* (Jan. 2020). <https://www.nacds.org/pdfs/pharmacy/2020/NACDS-NASP-NCPA-COD-Report-01-31-2020-Final.pdf> (accessed Dec. 6, 2024) at 17 (reporting the mean cost of dispensing at Missouri pharmacies in 2019 as $14.13); "The Cost of Dispensing Study." *Coalition for Community Pharmacy*

statute at $3 as of 1996, raised it to $4.84 effective March 30, 2014, raised it to $14.37 starting April 1, 2017 and set it at $12.22 for February 1, 2021 onward.[112]

71. The results of this approach to measuring the retail prices for TDF-based drugs are presented below in **Table 9**: *Estimated Retail Prices for TDF-Based Drugs, 2003-2015*.

Table 9: *Estimated Retail Prices for TDF-Based Drugs, 2003-2015*[113]

TDF Drug	Year	Average WAC	Average Retail Price
ATRIPLA	2006	[redacted]	
	2007		
	2008		
	2009		
	2010		
	2011		
	2012		
	2013		
	2014		
	2015		
COMPLERA	2011		
	2012		
	2013		
	2014		
	2015		
STRIBILD	2012		
	2013		
	2014		
	2015		
TRUVADA	2004		
	2005		
	2006		
	2007		
	2008		
	2009		
	2010		
	2011		
	2012		
	2013		
	2014		

Action (Aug. 2015). <https://ncpa.org/sites/default/files/pdf/mpi_cod_2015.pdf> (accessed Dec. 6, 2024) at 2, 23 (reporting the mean cost of dispensing at Missouri pharmacies in 2013 as $10.39).

[112] 13 CSR 70-20.060 (Sept. 30, 1996); 13 CSR 70-20.060 (Feb. 28, 2014); 13 CSR 70-20.060 (June 30, 2021).

[113] Figures reported in 2024 dollars.

	2015	[redacted]
VIREAD	2003	
	2004	
	2005	
	2006	
	2007	
	2008	
	2009	
	2010	
	2011	
	2012	
	2013	
	2014	
	2015	

72. I validated both approaches to calculating the drugs' retail price by using data on sales, costs, and pricing from Walmart, CVS, and the Medicine Shoppe.[114, 115] Specifically, for each of these pharmacies, their data allowed me to measure the average price they charged customers for the TDF-based drugs at issue in this matter.[116] The results of this calculation are shown below in **Table 10**: *Average Sales Price for Select Pharmacies, 2010-2023*. **Table 10** also reports my calculated retail price for those same drugs. [redacted].[117]

[114] For a complete list of produced data used in my analysis, *see* Pharmacy Data Files in **Appendix B**: *Materials Considered*.

[115] I also reviewed a set of data from Walgreens, but it did not appear to include information identifying total number of prescription sales and instead was limited to monthly sales figures.

[116] To determine the average pharmacy retail price for each branded TDF drug, I summed the total payments and dispensed quantities for each month. I next calculated the price per unit by dividing the total payment by the total quantity dispensed. I scaled the price per unit to price per month by multiplying by the factor (365/12). For CVS, I excluded observations where both the copay amount and the insurance paid amount were recorded as $0. For Medicine Shoppe, I excluded observations that were recorded under "coordination of benefits count," as these appeared to represent negligible fee-based transactions and not charges for medication.

[117] [redacted]

Table 10: *Average Sales Price for Select Pharmacies, 2010-2023*[118]

TDF Drug	Pharmacy	Average Pharmacy Retail Price	MO Medicaid Reimbursement	Estimated Retail Price
ATRIPLA	CVS	[redacted]		
COMPLERA	CVS			
STRIBILD	CVS			
TRUVADA	CVS			
TRUVADA	Medicine Shoppe			
ATRIPLA	Walmart			
TRUVADA	Walmart			

B. P_1: Price for TDF-Based Drugs Absent Gilead's Misconduct.

73. I now turn to an economic analysis of the retail price that would have arisen in market equilibrium in a but-for world in which patients were informed of the efficacy and safety of TDF-based drugs. A reasonable and economically supported approach is to use the retail price of TDF-based drugs that existed in the market *after* Gilead's patent on TDF-based medication expired and several other manufacturers began producing generic versions of TDF-based drugs. This is because concurrently, TAF-based alternatives as well as peer-reviewed clinical research into TAF began becoming available, making clear the molecule's advantages over TDF. As I discuss below, the resulting price reflects demand in a world in which consumers had a more realistic picture of the comparative efficacy and safety of TDF than Gilead represented.

74. Gilead's patent on TDF expired in December 2017 and other pharmaceutical manufacturers began producing generics bioequivalent to Gilead's branded TDF-based drugs.[119] As can be seen in **Table 11**: *Growth in Generic Production of TDF-Based Drugs After Patent Expiration*, below, TDF going off-patent led to a substantial increase in competition as over a dozen manufacturers began

[118] Figures reported in 2024 dollars.

[119] Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2016) at 15 ("In 2013, Gilead and Teva Pharmaceuticals (Teva) reached an agreement in principle to settle the ongoing patent litigation concerning the four patents that protect tenofovir disoproxil fumarate in our Viread, Truvada and Atripla products. Under the agreement, Teva will be allowed to launch a generic version of Viread on December 15, 2017."); "As Patent Expires, AHF Calls on Gilead for 90% Price Reduction on Tenofovir-Based Drugs, Including Truvada." *AIDS Healthcare Foundation* (Oct. 17, 2017). <https://www.aidshealth.org/2017/10/patent-expires-ahf-calls-gilead-90-price-reduction-tenofovir-based-drugs-including-truvada> (accessed Nov. 25, 2024); "Generic Viread Availability." *Drugs.com* (Nov. 6, 2024). <https://www.drugs.com/availability/generic-viread.html> (accessed Nov. 13, 2024); "Teva Announces Exclusive Launch of Generic Viread in the United States." *Teva* (Dec. 15, 2017). <https://www.tevapharm.com/news-and-media/latest-news/teva-announces-exclusive-launch-of-generic-viread-in-the-united-states> (accessed Nov. 13, 2024).

producing TDF-based drugs that competed with Gilead's version. This provides a unique opportunity to observe how the market reacted to substantially lower priced TDF-based drugs.

Table 11: *Growth in Generic Production of TDF-Based Drugs After Patent Expiration*[120]

Year	Number of Generic Manufacturers	Number of Prescriptions Filled
2017	1	[redacted]
2018	7	
2019	11	
2020	10	
2021	16	
2022	17	
2023	16	

75. As a result of this greater market transparency, the demand curve for those TDF-based generic drugs will have shifted downwards to account for the incorporation of the newly revealed facts. As discussed above,[121] this downward shift in demand will result in a lower equilibrium market price for TDF-based drugs. *See* **Table 12**: *Price for TDF-Based Drugs Before and After TDF Went Off Patent*.

Table 12: *Price for TDF-Based Drugs Before and After TDF Went Off Patent*[122]

TDF Drug	Average WAC Before Patent Expires	Average WAC After Patent Expires
ATRIPLA	$2,647.27	$895.22
COMPLERA	$3,150.54	N/A
STRIBILD	$3,737.67	N/A
TRUVADA	$1,819.55	$629.32
VIREAD	$1,020.73	$501.48

76. This pattern is consistent with economic principles regarding demand elasticity and availability of substitutes. It is well known that the more (and better) substitutes for a good, the more elastic that good's demand curve.[123] In this instance, as substitutes (in the form of TAF formulations) became

[120] The IQVIA data used in this analysis contains data on prescriptions through June 2023. I reserve the right to update these figures based on any additional information or data that becomes available to me.
[121] *See supra* ¶¶ 52-56.
[122] Figures reported in 2024 dollars.
[123] Mankiw, N. Gregory. *Principles of Microeconomics, Fifth Edition*. Mason, Ohio: South-Western Cengage Learning (2009) at 90 ("Goods with close substitutes tend to have more elastic demand because it is easier for consumers to switch from that good to others.").

available, demand for TDF formulations became more elastic and consumers switched to TAF-based drugs.[124] In other words, when TAF drugs entered the market as substitutes for TDF drugs, indeed as more appealing substitutes, it is thus only natural that TDF drugs could not command nearly as high a price.

77. Also, as previously discussed in Section IV.C, the pricing in TDF-based drugs decline may understate the true preference for TAF as it does not correct for medical inertia in switching to new therapies. Thus, my damages calculation methodology relies on conservative assumptions that, if anything, understate the harm to patients from delayed access to TAF-based medications. The fact that substantial switching to TAF occurred despite these headwinds provides even stronger evidence of TAF's superiority over TDF.

78. To calculate the market price for TDF-based drugs absent Gilead's misrepresentation, I use the average price of generic TDF-based drugs sold for the period of December 2017 to June 2023, subject to data availability. To calculate this, I used WAC data available to me through the Symphony Health data vendor.[125] I next performed the same steps described above to estimate the retail price for those same generics.[126, 127]

79. As is clear from **Table 13**: *Average Retail vs Generic Price of TDF-Based Drugs*, below, the average price of generic TDF-based drugs is substantially below the retail price of those same retail TDF-based drugs sold by Gilead.[128] This is consistent with the predictions of economic theory, discussed above, that the equilibrium price for TDF-based drugs would be negatively impacted by the revelation to the market that Gilead had misrepresented the efficacy and safety of TDF-based drugs.

---

[124] *See supra* Section IV.C.
[125] "Symphony Field Definitions." *Bloomberg, L.P.* (Aug. 2, 2024) (accessed Dec. 6, 2024) at tab "Data Metrics and API Fields."
[126] *See supra* ¶¶ 63-71.
[127] I used a wholesaler markup of 18.5 percent per the study by Sood, et al. *See* Sood, Neeraj, et al. "The Flow of Money Through the Pharmaceutical Distribution System." *Schaeffer Center White Paper Series* (June 2017). <https://healthpolicy.usc.edu/wp-content/uploads/2017/06/The-Flow-of-Money-Through-the-Pharmaceutical-Distribution-System_Final_Spreadsheet.pdf> (accessed Nov. 22, 2024) at 5. As exact manufacturer rebates are proprietary and rebates for many brand drugs can be higher than those for generics, I conservatively exclude rebates from this calculation entirely; however, it is extremely likely that at least *some* rebates were paid by generic manufacturers. Including these rebates would lower the estimated but-for price.
[128] These calculations use the first approach described above to measure the retail price for TDF-based drugs. That is, I calculated the Missouri statutory Medicaid reimbursement rate of WAC plus 10 percent for each drug. The alternate methodology for identifying generic prices by adjusting WACs for rebates, wholesaler markups, and dispensing fees can be applied as well, and I reserve the right to do so if asked.

Table 13: *Average Retail vs Generic Price of TDF-Based Drugs*[129]

Year	Average Retail Price	Average Generic Price
2017	[redacted]	$1,284.45
2018		$548.32
2019		$257.69
2020		$276.93
2021		$340.42
2022		$166.94
2023		$122.66

80. Generic prices provide a reliable benchmark for the retail price of branded TDF-based drugs in the but-for world where TAF was available and TDF's comparative risks were well known, despite the absence of generic competition in such but-for world. This is because the real-world generic data reflects the market price at which Gilead, just like the generic sellers, would have needed to continue to sell its TDF-based drugs to consumers who viewed TAF as a more desirable substitute. In other words, the real-world generic pricing reflects that manufacturers of TDF were operating in a market with a real threat of losing all their customers to TAF.[130]

C. Q_0: Quantity of TDF-Based Drugs Purchased By Class Members

81. The third required component needed to apply my class-wide damages methodology is the number of actual TDF-based drugs sold to Class Members. That data is available to me through the IQVIA data vendor, which provides information on number of prescriptions and total units sold on an annual

[129] Retail and generic prices are calculated using the Missouri Medicaid reimbursement formula of WAC plus 10 percent, as described above. Figures reported in 2024 dollars. For 2017, both retail and generic prices are calculated for the month of December only, reflecting generic TDF's availability starting December 15, 2017. As of the date of this report, neither Complera nor Stribild have a competing generic formulation. As such, I estimate the but-for price for these drugs by calculating the average ratio of the generic to the branded price for Atripla, Truvada, and Viread, and then multiplying the average retail price of branded Complera and Stribild by this ratio.

[130] I also note that the decline in price after the introduction of generics is well beyond what the academic literature might typically expect. For instance, Conti and Berndt found that the price of oral medication for complex cancer treatment molecules, similar to the specialty oral drugs of TAF and TDF, declined by 25 to 26 percent following the introduction of generics. This is because the resulting TDF generic price incorporates the additional information regarding the relative safety and efficacy of TDF and TAF, as TAF had been finally released to the market at close to the same time that TDF-based generics became available. Consistent with this, consumers have shown a clear preference for TAF, even when TDF became available at generic prices, as demonstrated in Section IV.C. *See* Conti, Rena M. and Ernst R. Berndt. "Specialty Drug Prices and Utilization After Loss of U.S. Patent Exclusivity, 2001-2007." *Measuring and Modeling Health Care Costs*. Eds. Ana Aizcorbe, Colin Baker, Ernst R. Berndt and David M. Cutler. Chicago: University of Chicago Press for the National Bureau of Economic Research (2018).

basis for each of the TDF-based drugs to Missouri patients during the Class Period.[131] IQVIA is widely recognized as an authoritative and trusted source of pharmaceutical data, including for drug manufacturers.[132]

D. Illustrative Example of Class-Wide Damages Methodology

82. Having described how economic analysis can be used to measure class-wide damages attributable to Gilead's misconduct, I now present an example calculation of this class-wide damages methodology for the TDF-based drugs, Viread, Truvada, Atripla, Complera, and Stribild.

83. Using the class-wide damages methodology that used data on Missouri's state Medicaid statutory reimbursement as WAC plus 10 percent, as described above, I found that Gilead charged a retail price of between [redacted] monthly for Viread during the Class Period.[133] However, my analysis found that, after generic manufacturers entered and revealed information about the safety and efficacy of Viread (that Gilead had hidden or misrepresented), the average monthly price for Viread generics was just $190.14. Finally, I can use the number of prescriptions of Viread filled for Class Members during the Class Period to calculate the total damages to Class Members attributable to the lost benefit of the bargain that they incurred due to Gilead's misconduct.

84. **Table 14**: *Example Damages for Viread*, below, shows how this damages methodology can be applied to calculate damages to Class Members for this exemplar drug. In total, this methodology indicates that Gilead caused roughly [redacted] in damages to Class Members from sales of TDF-based drug Viread.

---

[131] IQVIA data on quantities sold of TAF and TDF drugs was produced in this action. "CDS.ZXPF.CLIENT.OUTPUT.2001-2005"; "CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023." I cross-checked the national drug codes ("NDCs") recorded in the IQVIA data with the FDA's lists of all NDCs and excluded drug NDCs and removed the handful of observations that either had no record or were recorded as "I" for "Inactivated by the FDA" in the excluded drug data. *See* "NDC Database File." *U.S. Food and Drug Administration*. <https://www.fda.gov/drugs/drug-approvals-and-databases/national-drug-code-directory> (accessed Dec. 18, 2024); "NDC Database Excluded Drugs Database File." *U.S. Food and Drug Administration*. <https://www.fda.gov/drugs/drug-approvals-and-databases/national-drug-code-directory> (accessed Dec. 18, 2024).

[132] *See, e.g.*, "IQVIA Data-as-a-Service." *Snowflake*. <https://app.snowflake.com/marketplace/listing/GZSOZ5C6AN/iqvia-iqvia-data-as-a-service> (accessed Dec. 19, 2024) (stating that IQVIA offers a dataset which for "over 40 years … has been providing pharmaceutical manufacturers with insight into which non-retail outlets are purchasing their and their competitors' products and how sales change over time" as well as national sales data and prescription data derived from "[c]ontinuous country level market surveys"); "IQVIA Named to FORTUNE's 2020 List of 'World's Most Admired Companies.'" *IQVIA* (Jan. 21, 2020). <https://www.iqvia.com/newsroom/2020/01/iqvia-named-to-fortunes-2020-list-of-worlds-most-admired-companies> (accessed Dec. 19, 2024) ("[IQVIA] has been named to FORTUNE magazine's 'World's Most Admired Companies' list. IQVIA has received this distinction every year, since its inception[.] … [IQVIA] is a leading global provider of advanced analytics, technology solutions and contract research services to the life sciences industry.").

[133] Figures reported in 2024 dollars.

Table 14: *Example Damages for Viread*

Year	Average Retail Price	Total Prescriptions Filled	Average Generic Retail Price	Damages
2003	[redacted]			
2004				
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				
2013				
2014				
2015				

85. That same methodology shows that Gilead charged a retail price of between [redacted] monthly for Truvada during the Class Period. However, my analysis found that, after generic manufacturers entered and revealed information about the safety and efficacy of Truvada (that Gilead had hidden or misrepresented), the average monthly price for Truvada generics was just $268.08. Finally, I can use the number of prescriptions of Truvada filled for Class Members during the Class Period to calculate the total damages to Class Members attributable to the lost benefit of the bargain that they incurred due to Gilead's misconduct.

86. **Table 15**: *Example Damages for Truvada*, below, shows how this damages methodology can be applied to calculate damages to Class Members for this exemplar drug. In total, this methodology indicates that Gilead caused over [redacted] in damages to Class Members from sales of TDF-based drug Truvada.

Table 15: *Example Damages for Truvada*

Year	Average Retail Price	Total Prescriptions Filled	Average Generic Retail Price	Damages
2004	[redacted]			
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				
2013				
2014				
2015				

87. That same methodology shows that Gilead charged a retail price of between [redacted] monthly for Atripla during the Class Period. However, my analysis found that, after generic manufacturers entered and revealed information about the safety and efficacy of Atripla (that Gilead had hidden or misrepresented), the average monthly price for Atripla generics was just $415.02. Finally, I can use the number of prescriptions of Atripla filled for Class Members during the Class Period to calculate the total damages to Class Members attributable to the lost benefit of the bargain that they incurred due to Gilead's misconduct.

88. **Table 16**: *Example Damages for Atripla*, below, shows how this damages methodology can be applied to calculate damages to Class Members for this exemplar drug. In total, this methodology indicates that Gilead caused roughly [redacted] dollars in damages to Class Members from sales of TDF-based drug Atripla.

Table 16: *Example Damages for Atripla*

Year	Average Retail Price	Total Prescriptions Filled	Average Generic Retail Price	Damages
2006	[redacted]			
2007				
2008				
2009				
2010				
2011				
2012				
2013				
2014				
2015				

89. That same methodology shows that Gilead charged a retail price of between [redacted] monthly for Complera during the Class Period. However, my analysis found that, after generic manufacturers entered and revealed information about the safety and efficacy of Complera (that Gilead had hidden or misrepresented), the average monthly price for Complera generics was just $430.88. Finally, I can use the number of prescriptions of Complera filled for Class Members during the Class Period to calculate the total damages to Class Members attributable to the lost benefit of the bargain that they incurred due to Gilead's misconduct.

90. **Table 17**: *Example Damages for Complera*, below, shows how this damages methodology can be applied to calculate damages to Class Members for this exemplar drug. In total, this methodology indicates that Gilead caused roughly [redacted] in damages to Class Members from sales of TDF-based drug Complera.

Table 17: *Example Damages for Complera*

Year	Average Retail Price	Total Prescriptions Filled	Average Generic Retail Price	Damages
2011	[redacted]			
2012				
2013				
2014				
2015				

91. That same methodology shows that Gilead charged a retail price of between [redacted] and [redacted] monthly for Stribild during the Class Period. However, my analysis found that, after generic manufacturers entered and revealed information about the safety and efficacy of Stribild (that Gilead had hidden or misrepresented), the average monthly price for Stribild generics was just $531.19. Finally, I can use the number of prescriptions of Stribild filled for Class Members during the Class Period to calculate the total damages to Class Members attributable to the lost benefit of the bargain that they incurred due to Gilead's misconduct.

92. **Table 18**: *Example Damages for Stribild*, below, shows how this damages methodology can be applied to calculate damages to Class Members for this exemplar drug. In total, this methodology indicates that Gilead caused roughly [redacted] in damages to Class Members from sales of TDF-based drug Stribild.

Table 18: *Example Damages for Stribild*

Year	Average Retail Price	Total Prescriptions Filled	Average Generic Retail Price	Damages
2012	[redacted]			
2013				
2014				
2015				

93. **Table 19**: *Example Damages for All TDF-Based Drugs*, summarizes this example of how these class-wide damages can be calculated for all the TDF-based drugs during the Class Period. In total, damages across all drugs are $678.1 million over the class period. That is, Gilead caused over $678 million dollars in harm to Missouri consumers when they were deprived of the benefit of the bargain for the HIV drugs they purchased.

Table 19: *Example Damages for All TDF-Based Drugs*

TDF Drug	Average Retail Price	Total Prescriptions Filled	Average Generic Retail Price	Damages
ATRIPLA	[redacted]			
COMPLERA				
STRIBILD				
TRUVADA				
VIREAD				

94. Damages calculated for these TDF-based drugs represents the lost benefit of the bargain for patients based on them paying for Viread despite not knowing the side effect profile of TAF-based alternatives that Gilead had allegedly concealed and misrepresented.

95. Because this methodology identifies the damages associated with each purchase of TDF-based medications, it can easily be adapted to exclude any specifically identified purchases. For example, I understand from counsel that there are certain personal-injury plaintiffs who are excluded from the class. To the extent these individuals are identified by Gilead, their prescriptions can easily be excluded from the damages calculation. Similarly, I rely on an assumption from counsel that TAF should have been available before July 2003. To the extent a different class period should apply, I can easily identify the damages for any class period where the modeled market conditions exist (e.g., with full knowledge of TDF's inferior safety profile and availability of TAF).

VI. THERE EXISTS A CLASS-WIDE METHODOLOGY FOR CALCULATING THE UNJUST ENRICHMENT THAT GILEAD RECEIVED DUE TO ITS ALLEGED MISCONDUCT.

96. I understand that Plaintiffs allege that, through its misconduct, Gilead unjustly enriched itself by selling TDF-based drugs that would have otherwise been sold at a lower price or substituted for TAF-based drug purchases. That is, Plaintiffs seek disgorgement of the unjust profits Gilead made from its TDF-based drugs.

97. As a matter of economics, the profits that Gilead made during the Class Period through its sale of TDF-based drugs reflects the amount by which Gilead was enriched due its misconduct in misrepresenting the safety profile of TAF versus TDF-based drugs and delaying seeking approval for TAF. In this section, I present a method to calculate the profits Gilead earned from TDF-based drugs

during the Class Period.[134] My method is supported by economic principles and analysis and is common to all Class Members.

98. Economically, the profit Gilead gained from sales of the TDF-based drugs in the state of Missouri is calculated as the difference between the net sales of these drugs and their cost of goods sold ("COGS"). Net sales refer to the amount of revenue Gilead earned from the sales of its TDF-based drugs, after deducting returns, discounts, chargebacks, and co-pay assistance. Cost of goods sold includes the costs of materials and direct labor used to manufacture the TDF-based drugs.

99. Equivalently, profit can be calculated by multiplying (i) net sales of TDF-based drugs and (ii) the gross profit margin per drug,[135] as given by the formula:

$$Profit = Net\ Sales * Profit\ Margin$$

100. To calculate profits according to this method, two data points are needed: (i) Gilead's total Missouri net sales of TDF-based drugs and (ii) Gilead's per-unit profit margin for TDF-based drugs. I discuss how these can be calculated in turn.

101. Gilead reports global net sales for TDF-based drugs annually in its form 10-K filed with the SEC,[136] along with company-wide revenue generated from sales both in the U.S and worldwide. Using these numbers, I can calculate Gilead's U.S. revenue as a share of its global revenue. I next use this ratio to scale the annual global net sales of TDF-based drugs to arrive at Gilead's annual net sales of TDF-based drugs in the U.S.

102. I use Gilead's annual net sales of TDF-based drugs in the U.S. to determine the net sales of TDF-based drugs in the state of Missouri, according to the following methodology. For each TDF-based drug and for each year, I calculate the fraction of Gilead's U.S. prescription sales that were in Missouri, relying on two separate pieces of data. The first is the number of prescriptions of the at-issue TDF-based drugs in Missouri, which was made available to me through discovery.[137] The second is the number of prescriptions of those TDF-based drugs in the U.S, which I obtained from

[134] All dollar figures are in real, not nominal, January 2024 dollars, adjusting for the change in prices as measured by the consumer price index. "Consumer Price Index for All Urban Consumers: All Items in U.S. City Average (CPIAUCSL)." *FRED*. <https://fred.stlouisfed.org/series/CPIAUCSL> (accessed Dec. 10, 2024).
[135] The gross margin is one minus the ratio of cost of goods sold to net sales.
[136] *See, e.g.*, Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2012) at 55.
[137] *See* "CDS.ZXPF.CLIENT.OUTPUT.2001-2005"; "CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023."

Symphony Health, a healthcare data vendor.[138] I then calculate the ratio of prescriptions in Missouri to total U.S. prescriptions, by year and by drug. I then multiply this drug-year-specific ratio by each drug's U.S. net sales, as determined in the previous step, to arrive at its net sales in Missouri.

103. The results of this analysis indicate that Gilead made over [redacted] during the Class Period in net sales from its TDF-based drugs, as shown below in **Table 20**: *Gilead's Missouri Net Sales of TDF-Based Drugs, 2003-2015*.[139]

Table 20: *Gilead's Missouri Net Sales of TDF-Based Drugs, 2003-2015*[140]

Year	Net Sales
2003	[redacted]
2004	
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	
2013	
2014	
2015	

104. While Gilead's company-wide gross margins are reported annually in its form 10-K filing, Gilead has not disclosed its gross margin specific to each TDF-based drug.[141] However, Gilead's revenue and profits during the Class Period was overwhelmingly driven by TDF-based drugs.[142]As such,

[138] "Symphony Field Definitions." *Bloomberg, L.P.* (Aug. 2, 2024) (accessed Dec. 6, 2024) at tab "Data Metrics and API Fields."
[139] The IQVIA data used in this analysis contains data on prescriptions through June 2023. I reserve the right to update these figures based on any additional information or data that becomes available to me.
[140] Figures reported in 2024 dollars.
[141] I reserve the right to update this methodology and calculations should such figures or data become available to me.
[142] In 2003, Viread generated $566.5 million in sales, or 65 percent of Gilead's total revenues. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2003) at 2. In 2004, Viread and Truvada combined accounted for 68 percent of Gilead's product sales. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2004) at 3. In 2005, Viread and Truvada combined accounted for 74 percent of Gilead's product sales. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2005) at 3. In 2006, Viread, Truvada, and Atripla combined accounted for 81 percent of Gilead's product sales. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2006) at 3. In 2007, Viread, Truvada, and Atripla combined accounted for 83 percent of

Gilead's stated overall gross margin is an appropriate choice to use to analyze its profits attributable to TDF-based drugs. Gilead's annual profit margin during the Class Period is shown below in **Table 21**: *Gilead's Gross Profit Margin, 2003-2015*. Over the entire Class Period, Gilead's average profit margin was 80.3 percent.

Table 21: *Gilead's Gross Profit Margin, 2003-2015*

Year	Gross Margin
2003	87%
2004	87%
2005	86%
2006	83%
2007	79%
2008	78%
2009	75%
2010	75%
2011	74%
2012	74%
2013	74%
2014	85%
2015	88%

105. Combining these and multiplying Gilead's Missouri net sales of TDF-based drugs by its profit margins yield its total profits earned from Class Members as [redacted] during the Class Period. *See* **Table 22**: *Gilead's Profits from Missouri TDF-Based Drug Sales, 2003-2015*, below.

Gilead's product sales. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2007) at 4. In 2008, Viread, Truvada, and Atripla combined accounted for 84 percent of Gilead's product sales. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2008) at 3. In 2009, Viread, Truvada, and Atripla combined accounted for 85 percent of Gilead's product sales. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2009) at 3. In 2010, Viread, Truvada, and Atripla combined accounted for 86 percent of Gilead's product sales. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2010) at 5. In 2011, Viread, Truvada, Atripla, and Complera/Eviplera combined accounted for 84 percent of Gilead's product sales. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2011) at 5. In 2012, Gilead disclosed sales percentages for Truvada and Atripla, which accounted for 83 percent of Gilead's antiviral product sales combined. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2012) at 56. In 2013, Gilead disclosed sales percentages for Truvada and Atripla, which accounted for 73 percent of Gilead's antiviral product sales combined. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2013) at 59. In 2014, Gilead disclosed sales percentages for Truvada and Atripla, which accounted for 30 percent of Gilead's antiviral product sales combined. Gilead also remarked that Complera/Eviplera sales increased 52 percent. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2014) at 59. In 2015, Gilead disclosed sales percentages for Truvada, Atripla, Complera/Eviplera, and Viread, which accounted for 30 percent of Gilead's antiviral product sales combined. Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2015) at 51-52.

Table 22: *Gilead's Profits from Missouri TDF-Based Drug Sales, 2003-2015*[143]

Year	Net Sales	Gross Margin	Gross Profit
2003	[redacted]		
2004			
2005			
2006			
2007			
2008			
2009			
2010			
2011			
2012			
2013			
2014			
2015			

106. Finally, I note that, economically, Gilead's ability to unjustly enrich itself, as measured here to be $575.6 million, provided a strong incentive for Gilead to engage in its misconduct, misrepresent the efficacy and side-effects of TDF, and delay seeking approval for TAF. In other words, had Gilead known that they would be forced to disgorge this unjust enrichment amount, they therefore would *not* have had the appropriate incentives to engage in their misconduct.

107. I note that the damages methodologies contained herein likely understate the total harm to consumers and Gilead's unjust enrichment due its misconduct, which additionally caused a reduction in patients' quality of life owing to the inappropriate delay in the market availability of safer TAF-based medications. As I described above in Section IV.B, Gilead inappropriately delayed seeking approval for TAF for over 12 years, thereby depriving consumers of the ability to purchase TAF-based drugs for at least those 12 years. As a result of this delay, consumers were forced to use TDF-based drugs instead of the more effective and less-damaging TAF option, causing real and measurable costs to those patients.[144] There are various economically sound methodologies that

[143] Figures reported in 2024 dollars.

[144] The potential harm is large, as tenofovir is one of the most commonly used NRTIs for HIV treatment. *See* Pau, Alice K. and Jomy M. George. "Antiretroviral Therapy: Current Drugs." *Infectious Disease Clinics of North America* 28.3 (2014): 371-402 ("Today, the most commonly used NRTIs are tenofovir and abacavir, both used in combination of emtricitabine or lamivudine.").

could reliably quantify the harm Gilead's conduct caused, such as an analysis of quality-adjusted life years.[145]

Dated: December 20, 2024

W. David Bradford, Ph.D.

[145] The Encyclopedia of Behavioral Medicine defines a QALY as "a standardized measure of disease burden which combines both survival and health-related quality of life into a single index," and which "provides a reasonable estimate of the amount of quality time (i.e., health benefit) an individual may experience as a result of a particular health program or intervention." "Quality-Adjusted Life Years (QALYs)." *Springer Nature.* <https://link.springer.com/referenceworkentry/10.1007/978-1-4419-1005-9_613> (accessed Dec. 18, 2024). QALY "is the academic standard for measuring how well all different kinds of medical treatments lengthen and/or improve patients' lives, and therefore the metric has served as a fundamental component of cost-effectiveness analyses in the US and around the world for more than 30 years." "Cost-Effectiveness, the QALY, and the evLYG." *Institute for Clinical and Economic Review*. <https://icer.org/our-approach/methods-process/cost-effectiveness-the-qaly-and-the-evlyg> (accessed Dec. 19, 2024).

Appendix A

Curriculum Vitae

David W. Bradford

Department of Public Administration & Policy
University of Georgia
Athens, GA 30602

Phone: (706) 542-9660
E-mail: bradfowd@uga.edu

Education

- Ph.D., Economics, Louisiana State University, 1991.
- M.S., Economics, Louisiana State University, 1989.
- B.S., Foreign Languages, Mississippi State University, 1987.

Research and Teaching Interests

- Health Economics, Health Policy
- Substance Use Policy and Outcomes
- The Pharmaceutical Industry
- Time and Risk Preferences

Professional Experience

- **Department of Public Administration and Policy, University of Georgia**
  2008-present: Professor (with tenure) and George D. Busbee Chair in Public Policy
- **Department of Economics, University of Georgia**
  2013-present: Professor (Secondary Appointment)
- **Frank Batten School of Leadership and Public Policy, University of Virginia** (January 2020-May 2020): Talbott Visiting Professor
- **William A. and Barbara R. Owens Institute for Behavioral Research, University of Georgia** (March 2012-present): Affiliate.
- **Center for Health Economic and Policy Studies, Medical University of South Carolina** (December 2002-December 2008): Director.
- **Department of Health Administration and Policy, Medical University of South Carolina** (July 2003-July 2008): Professor (with tenure)
- **Department of Health Administration and Policy, Medical University of South Carolina** (2004-2005): Department Chair (Interim).
- **Department of Health Administration and Policy, Medical University of South Carolina** (July 1998-2003): Associate Professor (with tenure).
- **Department of Medicine, Yale University**
  (March 2012- present): Visiting Associate Professor (sabbatical).
- **Department of Economics, University of New Hampshire**
  (August 1996-May 1998): Associate Professor (with tenure).
- **Department of Economics, University of New Hampshire**
  (August 1991-May 1996): Assistant Professor

Professional Leadership

- Board of Directors (Member): American Society of Health Economists (2021-present).
- Board of Directors (Member): International Health Economics Association (2011-2017).
- Steering Committee (Chair): Southeastern Health Economics Study Group, (2001-present).
- Steering Committee (Member): Annual Health Economics Conference (2008-present).
- Committee Chair: American Society of Health Economists, ASSA Session Selection Committee (2022-present).
- Committee Member: American Society of Health Economists, Committee on Professional Conduct (2023-present).

Publications

BOOKS AND BOOK CHAPTERS

1) Nguyen T, Andraka-Christou B, Buchwalder K, **Bradford WD**, Simon K. "To Battle The Fentanyl Overdose Epidemic, Modernize Methadone Treatment." *Health Affairs Forefront*. DOI: 10.1377/forefront.20240815.54389. August 20, 2024.

2) "Signatory, Brief of Antitrust Economists as Amici Curiae before the Supreme Court", Federal Trade Commission v. Actavis, Inc., et al., No. 12-416 (February 28, 2013).

3) **Bradford WD**, Kleit AN. "Direct to consumer advertising: research amid the controversy." In AM Jones (ed.) *Elgar Companion to Health Economics, 2nd Edition* (Cheltenham, UK: Elgar Publishing, 2011).

4) **Bradford WD**, Burgess JF. "Individual Time Preferences and Health Behaviors, with An Application on Health Insurance," in Daniel Slottje and Rusty Tchertis, eds. *Contributions in Economic Analysis*. (Bingley, UK : Emerald Group Publishing Limited, forthcoming).

5) **Bradford WD**. "Service Utilization Comparison of South Carolina Medicaid FFS, Physician Enhanced Program (PEP) and Health Maintenance Organization (HMO)." *The Journal of the South Carolina Medical Association*, forthcoming.

6) **Bradford WD**. "Introduction to the Third Annual Southeastern Health Economics Study Group Conference." *Southern Economic Journal*. 73(3): 550-552, 2007.

7) **Bradford WD**, Kleit AN. "Evaluating the Welfare Effects of Drug Advertising" *Regulation*. 29(1): 58-62. Spring 2006.

8) **Bradford WD**, Kleit AN. "Direct to consumer advertising." In AM Jones (ed.) *Elgar Companion to Health Economics* (Cheltenham, UK: Elgar Publishing, 2006).

9) **Bradford WD**. "Cost Benefit Analysis in Health Services Research." In E Chumney and K Simpson (eds.) *Designs for Outcomes Research* (Bethesda, MD: American Society of Health-System Pharmacists, 2006).

10) *Bradford WD*, ***Kleit AN, Neitert PJ, Steyer T, McIlwain T, Ornstein S. "The Effect of Direct to Consumer Television Advertising on the Timing of Treatment"*** **AEI-Brookings Papers, 05-19. *Sep 2005.***

11) Tilley BC, Wisdom K, Sadler ZE, **Bradford WB**. "Overcoming Barriers to the Inclusion of Older African Americans in Health Outcomes Research." In: Curry L & Jackson JS (Eds.). *Recruiting and Retaining Racial and Ethnic Elders in Health Research*. Washington, D.C.: Gerontological Society of America, 2003.

12) **Bradford WD.** "National Trends in Physician Income," in *The Organization and Management of Physician Services: Evolving Trends*, Ronald B. Conners, editor (American Hospital Association Publishing Company), 1997.

13) **Bradford WD**, Dahl C. "Preliminary Report on a Cost-Benefit Study of Mandated Ethanol-Gasoline Blends," *Proceedings of the Eleventh Annual North American Conference for the International Association of Energy Economists*, (October 1989), pp. 226-236.

PEER-REVIEWED JOURNALS

1) Bradford AC, Lozano-Rojas F, Shone HB, **Bradford WD**, Abraham AJ. "Cannabis Laws and Utilization of Medications for the Treatment of Mental Health Disorders." *JAMA – Network Open*. (forthcoming).

2) Cesur R, Sabia JJ, **Bradford WD**. "The Effect of Combat Deployments on Veteran Opioid Abuse." *Health Economics*. (forthcoming).

3) **Bradford WD**, Lozano-Rojas F. "Higher Rates of Homelessness Are Associated with Increases in Accidental Drug and Alcohol Mortality." *Health Affairs* (forthcoming).

4) Bradford, AC, **Bradford WD**. "The Effect of State Housing Policies on Eviction Filings and Judgements in the United States, 2001-2018." *Housing Policy Debate* (forthcoming).

5) Steuart SR, **Bradford WD**. "The Association Between Medical Cannabis Laws and Flows of Opioids by Dosage Strength to US Pharmacies - Evidence from Detailed ARCOS Data, 2006-2014." *Contributions in Economic Analysis.* Volume 297. (forthcoming).

6) Andraka-Christou B, Nguyen T, **Bradford WD**, Simon K. "Buprenorphine treatment for opioid use disorder: comparison of insurance restrictions across payers, 2017-2021." *Health Affairs*. 42(5): 658-664. 2023.

7) Raman S, Maclean JC, **Bradford WD**, Drake C. "Recreational Cannabis and Opioid Distribution." *Health Economics*. 32(4): 747-754. 2023

8) **Bradford WD**, Doucette MH. "Effect of a Brief Intervention on Respondents' Subjective Perception of Time and Discount Rates." *Journal of Risk and Uncertainty*. 66:47-75. 2023.

9) Nguyen T, Andraka-Christou B, Arnaudo C, **Bradford WD**, Simon K, Spetz J. "Analysis of County Characteristics and Clinicians Authorized to prescribe Buprenorphine Following Changes in Federal Education Requirements." *JAMA – Network Open*. 5(10): e2237912. 2022.

10) Nguyen T, Chua KP, Andraka-Christou B, **Bradford WD**, Simon K. "Trends in Buprenorphine Coverage and Prior Authorization Requirements in US Commercial Formularies: 2017-2021." *JAMA Health Forum*. 3(7): 221821. 2022.

11) Nguyen T, Andraka-Christou B, **Bradford WD**, Simon K. "Opting into the Public List of DATA-Waivered Practitioners: Variations by Specialty, Treatment Capacity, and Practitioner Characteristics" *Journal of Addiction Medicine*. 16(3): 197-202. 2022.

12) Krousel-Wood M, Peacock E, **Bradford WD**, Mohundro B, Craig LS, O'Connell S, Bazzano L, Shi L, Ford M. "Time preference for immediate gratification: Associations with low medication adherence and uncontrolled blood pressure" *American Journal of Hypertension*. 35(3), 256-263. 2022.

13) Abraham AJ, Lawler EC, Harris SJ, Adams GB, **Bradford WD**. "Spillover of Medicaid Expansion to Prescribing of Opioid Use Disorder Medications in Medicare Part D." *Psychiatric Services*. 73(4), 418-424. 2022.

14) Nguyen T, Cantor J, Andraka-Christou B, **Bradford WD**, Simon K. "Where Did the Specialty Behavioral Health Workforce Grow between 2011 and 2019? Evidence from Census Data." *Journal of Substance Abuse Treatment*. 130 (2021): 108482. 2021.

15) Krousel-Wood M, Craig LS, Peacock E, Zlotnicj E, O'Connell S, **Bradford WD**, Shi L, and Petty R. "Medication Adherence: Expanding the Conceptual Framework." *American Journal of Hypertension.* 34(9), 895-909. 2021.

16) Nguyen T, Spetz J, Meunch U, Andraka-Christou B, **Bradford WD**, Simon K. "The Association between Scope of Practice Regulations and Nurse Practitioner Prescribing of Buprenorphine after the 2016 Opioid Bill." *Medical Care Research and Review*. 79(2), 290-298. 2021.

17) Atkins DN, **Bradford WD**. "The Effect of State-Level Sex Education Policies on Youth Sexual Behaviors." *Archives of Sexual Behavior*. 50: 2321-2333. 2021.

18) Andraka-Christou B, Nguyen T, **Bradford WD**, Simon K. "Assessing the Impact of Drug Courts on Provider-Directed Marketing Efforts by Manufactures of Medications for the Treatment of Opioid Use Disorder*." Journal of Substance Abuse Treatment*. 110:(March) 49-58. 2020.

19) Zier ER, **Bradford WD**. "To Attend or Not to Attend? The Effect of School-Immunization Exemption Policies on Enrollment Rates for Prekindergarten, Kindergarten and Elementary Aged Youth." *Vaccine*. 38(11): 2578-2584. 2020.

20) Bradford AC, **Bradford WD**. "The Effect of Evictions on Accidental Drug and Alcohol Mortality." *Health Services Research*. 55(1): 9-17. 2020.

21) Nguyen T, Andraka-Christou B, **Bradford WD**, Simon K. "Provider-Directed Marketing May Increase Prescribing of Medications for Opioid Use Disorder." *Journal of Substance Abuse Treatment*. 104: 104-115. 2019.

22) Nguyen T, **Bradford WD**, Simon K. "Pharmaceutical Payments to Physicians May Increase Prescribing for Opioids." *Addiction*. 114(6): 1051-1059. 2019.

23) Abraham AJ, Adams GB, Bradford AC, **Bradford WD**. "County-Level Access to Opioid Use Disorder Medications in Medicare Part D (2010-2015)." *Health Services Research*. 54(2): 390-398. 2019.

24) Nguyen T, Andraka-Christou B, Simon K, **Bradford WD**. "Rural versus Urban Comparison of Direct-to-Physician Commercial Promotion of Medications for Treating Opioid Use Disorder" *JAMA Network Open*. 2(12): e1916520. 2019. doi:10.1001/jamanetworkopen.2019.16520

25) Dalton TM, **Bradford WD**. "Better Together: Coexistence of For-profit and Nonprofit Firms with an Application to the U.S. Hospice Industry." *Journal of Health Economics*. 63 (1): 1-18. 2019.

26) Doucette MH, **Bradford WD**. "Dual Job Holding and the Gig Economy: Allocation of Effort Across Primary and Gig Jobs." *Southern Economic Journal*. 85(4): 1217–1242. 2019

27) **Bradford WD**, Dolan PJ, Galizzi MM. "Looking Ahead: Subjective Time Perception and Individual Discounting." *Journal of Risk and Uncertainty*. 58(1): 43-69. 2019.

28) **Bradford, WD** Turner, JL, Williams JW. "Off-Label Use of Pharmaceuticals: A Detection Controlled Estimation Approach." *Journal of Industrial Economics*. 66(4): 866-903. 2018.

29) Bradford AC, **Bradford WD.** "The Impact of Medical Cannabis Legalization On Prescription Medication Use and Costs in Medicare Part D." *Journal of Law and Economics*. 61(3), 461-487. 2019.

30) Bradford AC, **Bradford WD**, Abraham A., Adams GB. "The Impact of Medical Cannabis Laws on Opioid Prescribing in Medicare Part D, 2010-2015." *JAMA – Internal Medicine*. 178(5):667-672. 2018.

31) **Bradford, WD**. Courtemanch C, Heutel G, McAlanah P, Ruhm, C. "Time Preferences and Consumer Behavior." *Journal of Risk and Uncertainty*. 55(2-3): 119-145. 2017

32) Bradford AC, **Bradford WD**. "Medical Marijuana Laws May Be Associated With Decline In The Number Of Prescriptions For Medicaid Enrollees." *Health Affairs*, 36(5): 945-951, 2017.

33) Bradford AC, and **Bradford WD**. "Factors Driving the Diffusion of Medical Marijuana Legalization in the United States." *Drugs: Education, Prevention and Policy*, 24(1): 75-84, 2016.

34) McRoy L, Weech-Madonado R, **Bradford WD**, Menachemi N, Morrisey M, & Kilgore M. "The effects of direct-to-consumer advertising on medication use among Medicaid children with asthma." *Health Marketing Quarterly*. 33(3): 195-205, 2016.

35) Bradford AC, **Bradford WD**. "Medical Marijuana Laws Reduce Prescription Medication Use In Medicare Part D." *Health Affairs*. 35(7): 1230-1236, 2016.

- Debate in the literature on the paper included: Theodore L. Caputi and Keith Humphreys, "Medicare Recipients' Use Of Medical Marijuana." *Health Affairs* 35(10): 1936; and a reply by Ashley C. Bradford and W. David Bradford, "Medical Marijuana Laws: The Authors Reply." *Health Affairs* 35(10): 1937.

- "Most Read" and "Most Shared" article for 2016 for the journal Health Affairs (http://healthaffairs.org/blog/2016/12/21/the-top-10-health-affairs-articles-of-2016/)

36) Bullock, JB, **Bradford, WD**. "The Differential Effect of Compensation Structures on the Likelihood that Firms Accept New Patients by Insurance Type," *International Journal of Health Economics and Management*. 16(1): 65-88, 2016.

37) Li S**, Bradford WD**, Whelton PK, Krousel-Wood M. "Influences of Obesity on Healthcare Utilization: Gender Differences." *Journal of Investigative Medicine*. 64(2): 700-701, 2016.

38) **Bradford WD**, Kleit AN. "Impact of FDA Actions, DTCA and Public Information on the Market for Pain Medication" *Health Economics*. 24(7): 859-875, 2015.

39) **Bradford, W. D**., Mandich, A. " Some state vaccination laws contribute to greater exemption rates and disease outbreaks in the United States." *Health Affairs, 34*(8), 1383-1390, 2015.

40) Atkins DN, **Bradford WD**. "Association Between Increased Emergency Contraception Availability and Risky Sexual Practices" *Health Services Research*. *50*(3), 809-829, 2015. DOI: 10.1111/1475-6773.12251

41) Atkins DN, **Bradford WD**. "The Effect of Changes in State and Federal Policy for Non-Prescription Access to Emergency Contraception on Youth Contraceptive Use: A Difference-in-Difference Analysis Across New England States." *Contemporary Economic Policy*. 33(3), 405-417, 2015. DOI: 10.1111/coep.12081.

42) Jayawardhana J, **Bradford WD**, Jones W, Nietert PJ, Silvestri G. "Master Settlement Agreement (MSA) Spending and Tobacco Control Efforts." *PLOS ONE*, 9(12): e114706, 2014.

43) Atkins DN, **Bradford WD**. "Changes in State Prescription Contraceptive Mandates For Insurers: The Effect on Women's Contraceptive Use." *Perspectives on sexual and reproductive health* 46(1): 23-29, 2014.

44) **Bradford WD**, Lastrapes WD. "A Prescription of Unemployment? Recessions and the Demand for Mental Health Drugs" *Health Economics* 23(1): 1301-1325, 2014.

45) Saldana L, Chamberlain P, **Bradford WD**, Campbell M, Landsverk J. "The Cost of Implementing New Strategies (COINS): A Method for Mapping Implementation Resources Using the Stages of Implementation Completion." *Children and Youth Services Review*. 39 (2014): 177-182.

46) Sheidow A, Jayawardhana J, **Bradford WD**, Henggeler S, Shapiro SB. "Money Matters: Cost Effectiveness of Juvenile Drug Court with and without Evidence-Based Treatments." *Journal of Child & Adolescent Substance Abuse*. 21(1): 69-90, 2012.

47) **Bradford WD**, Kleit AN. "Can Credence Advertising Effects Be Isolated? Can They Be Negative?: Evidence From Pharmaceuticals" *Southern Economic Journal*. 78(1): 167-190, 2011. ***Winner of 2012 Georgescu-Roegen Prize (Best academic paper published in the Southern Economic Journal)***.

48) **Bradford WD**, Dolan P. "Getting Used to It: The Adaptive Global Utility Model." *Journal of Health Economics*. 29(6): 811-820, 2010.

49) **Bradford WD**, Silvestri G, Zoller J. "Estimating the Effect of Individual Time Preferences on the Use of Disease Screening." *Southern Economic Journal*. 76(4): 1005-1031, 2010.

50) **Bradford WD**. "The Association Between Individual Time Preferences and Health Maintenance Habits." *Medical Decision Making*. 30(February): 99-112, 2010.

51) **Bradford WD**, Kliet AN., Neitert PJ, Ornstein S. "The Effect of Direct to Consumer Television Advertising on the Timing of Treatment." *Economic Inquiry*. 48(2): 306-322, 2010.

52) Axon RN, **Bradford WD**, Egan BM. "The Role of Individual Time Preferences In Health Behaviors Among Hypertensive Adults: A Pilot Study." Journal of the American Society of Hypertension." *Journal of the American Society of Hypertension*. 3(1): 35-41, 2009.

53) Clancy C, Dismuke CE, Magruder K, Simpson K, **Bradford WD**. "Do Group Visits Lead to Lower Costs of Diabetes Care?" *American Journal of Managed Care,* 14(1): 39-44, 2008.

54) Terza JV, **Bradford WD**, Dismuke CE. "The Use of Linear Instrumental Variables Methods in Health Services Research and Health Economics: A Cautionary Note." *Health Services Research*. 43(3): 1102-1120, 2008.

55) Silvestri GA, Nietert PJ, Zoller J, Carter C, **Bradford WD**. "Attitudes Toward Screening for Lung Cancer Among Smokers and Their Non-Smoking Counterparts." *Thorax*, 62:126-130. 2007.

56) **Bradford WD**, Kleit AN., Neitert PJ, Ornstein S. "The Effect of Direct to Consumer Television Advertising for Hydroxymethylglutaryl Coenzyme A Reductase Inhibitors on the Attainment of LDL-C Goals." *Clinical Therapeutics*, 28(12): 2105-2118, 2006. Editorial written on paper *Clinical Therapeutics*, 28(12): 2104. Letters, and response by authors published in *Clinical Therapeutics*.

57) **Bradford WD**, Kleit AN, Neitert PJ, Steyer T, McIlwain T, Ornstein S. "How Direct to Consumer Television Advertising for Osteoarthritis Drugs Affects Physicians' Prescribing Behavior." *Health Affairs*. 25(5):1371-1377, 2006.

58) Masoudi FA, Baillie CA, Wang Y, **Bradford WD**, Steiner JF, Havranek EP, Foody JM, Krumholz HM. "The Complexity and Cost of Drug Regimens of Older Patients Hospitalized With Heart Failure in the United States, 1998-2001." *Archives of Internal Medicine*. 165:2069-2076, 2005.

59) **Bradford WD**, Kleit AN, Krousel-Wood MA, Re RN. "Comparing Willingness to Pay for Telemedicine Across a Chronic Heart Failure and Hypertension Population" *Telemedicine Journal*, 11(4):430-438, 2005.

60) Nietert PJ, **Bradford WD**, Kaste LM. "The impact of an innovative reform to the South Carolina Dental Medicaid System." *Health Services Research*, 40(4):1078-1091, 2005.

61) **Bradford WD**, Kleit AN, Krousel-Wood MA, Re RN. "Willingness to pay for telemedicine assessed by the double-bounded dichotomous choice method." *Journal of Telemedicine and Telecare*, 10(6): 325-330, 2004.

62) Wager KA, **Bradford WD**, Lee FW, Jones W, Kilpatrick AO. "Qualitative Evaluation of South Carolina's Postpartum/Infant Home Visit Program." *Public Health Nursing*, 21(6): 541-546, 2004.

63) Hueston WJ, **Bradford WD**, Sheperd TM. "Family medicine and hospital specialty match rates: Does the economy have anything to do with it?" *Family Medicine*. 35(4):265-269, 2004.

64) Sheidow AJ, **Bradford WD**, Henggeler SW, Rowland MD, Halliday-Boykins C, Schoenwald SK, Ward DM. "Treatment Costs for Youths in Psychiatric Crisis: Multisystemic Therapy versus Hospitalization." *Psychiatric Services*. 55: 548-554, 2004.

65) Ornstein S, Jenkins RG, Nietert PJ, Feifer C, Roylance LF, Nemeth L, Corley S, Dickerson L, **Bradford WD**, Litvin C. "A Multimethod Quality Intervention to Improve Preventative Cardiovascular Care." *Annals of Internal Medicine*. 141(7):523-532, 2004.

66) **Bradford WD**, Mobley L. "Employment-Based Health Insurance and the Effectiveness of Intra-Firm Competition between Insurance Providers." *Southern Economic Journal*, 70(4): 1012-1031, 2004.

67) **Bradford WD**, Kaste LM, Neitert PJ. "Continuity of Medical Care, Health Insurance, and Nonmedical Advice in the First 3 Years of Life." *Medical Care*, 42(1): 91-98, 2004.

68) **Bradford WD**. "Pregnancy and the Demand for Cigarettes." *American Economic Review*, 93(5): 1752-1763, 2003.

69) **Bradford WD**, Neitert PJ, Kaste LM, Lala RF. "Increased Dental Medicaid Reimbursement Rates in SC." *Journal of Public Health Dentistry* 2003; 63(S1):S37.

70) **Bradford WD**, Krumholz HM. "The Effect of Managed Care Penetration on the Treatment of Acute Myocardial Infarction in the Fee-For-Service Medicare Population." *International Journal of Health Care Finance and Economics,* 2:265-283, 2003.

71) Krumholz HM, Weintraub WS, **Bradford WD**, Heidenreich PA, Mark DB, Paltiel D. "The Cost of Prevention: Can we afford it? Can we afford not to do it?" *Journal of the American College of Cardiology* 2002; 40(4): 603-615.

72) **Bradford WD**, Kleit AN, Krousel-Wood MA, Re RN. "A Two-Part Model of the Cost of Treating Benign Prostatic Hyperplasia and the Impact of Innovation." *Applied Economics*, 34:1291-1299, 2002.

73) **Bradford WD**, Kleit AN, Krousel-Wood MA, Re RN. "Testing the Efficacy of Telemedicine: A Detection Controlled Estimation Approach." *Health Economics,* 10(6):553-564, 2001.

74) Krousel-Wood MA, Re RN, Abdoh A, Chambers R, Altobello C, Ginther B, **Bradford WD**, Kleit AN. "The Effects of Education on Patients' Willingness to Participate in a Clinical Trial of Telemedicine Targeting Medical Care of Hypertensives." *Journal of Telemedicine and Telecare*, 7(5):281-287, 2001.

75) **Bradford WD**, Kleit AN, Krousel-Wood MA, Re AN. "Stochastic Frontier Estimation of Cost Models within the Hospital." *Review of Economics and Statistics*, 83(2):302-309. 2001.

76) Wexler D, Chen J, Radford MJ, Yaari S, **Bradford WD**, Krumholz HM. "Predictors of Costs of Caring for Elderly Patients Discharged with Heart Failure." *American Heart Journal*, 142(2):350-57. 2001.

77) Druss BG, **Bradford WD**, Rosenheck RA, Radford MJ, Krumholz HM. "Quality of Medical Care and Excess Mortality in Older Patients with Mental Disorders" *Archives of General Psychiatry*, 58(6):565-72. 2001.

78) Krousel-Wood MA, Re RN, Abdoh A, Gomez N, Chambers RB, **Bradford WD**, Kleit AN. "A Method to Report Utilization for Quality Initiatives in Medical Facilities." *The Ochsner Journal*. 3(4):200-206, 2001.

79) Krousel-Wood MA, Re RN, Abdoh A, **Bradford WD**, Kleit AN, Chambers R, Altobello C, Ginther B, Gomez N. "Patient and Physician Satisfaction in a Clinical Study of Telemedicine in a Hypertensive Patient Population." *Journal of Telemedicine and Telecare*, **7**:206-211, 2001.

80) Krumholz HM, Chen YT, Vaccarino V, Wang Y, Radford MJ, **Bradford WD**, Horwitz RI. "Correlates and impact on outcomes of worsening renal function in patients greater than or equal to 65 years of age with heart failure." *American Journal of Cardiology*, 85(9): 1110-1113, 2000.

81) **Bradford WD**, Martin RL. "Partnerships, Intra-Firm Competition and Quality Choice in the Medical Profession." *Review of Industrial Organization*, 17: 193-208, 2000.

82) Druss BG, **Bradford WD**, Rosenheck RA, Radford MJ, Krumholz HM, "Mental Disorders and Use of Cardiovascular Procedures After Myocardial Infarction." *JAMA*, 283(4): 506-511, 2000.

83) Krumholz HM, Chen YT, **Bradford WD**, Cerese J. "Variations and correlates of length of stay among patients hospitalized with heart failure in academic hospitals." *American Journal of Managed Care*, 5(6): 715-723, 1999.

84) **Bradford WD**, Chen J, Krumholz HM. "Under-utilization of beta-blockers after acute myocardial infarction: pharmacoeconomic implications." *Pharmacoeconomics*, 15(3): 257-268, 1999.

85) Mobley L, **Bradford WD**. "'Profit' Variability Among Hospitals: Ownership or Location?" *Applied Economics*, 29: 1125-1138, 1997.

86) DeFelice LC, **Bradford WD**. "Relative Inefficiencies in Production between Solo and Group Practice Physicians" *Health Economics*, 6:455-465, 1997.

87) **Bradford WD**, Craycraft C. "Prospective Payments and Hospital Efficiency," *Review of Industrial Organization*, 11(6): 791-809, 1996.

88) **Bradford WD**. "Efficiency in Employment-Based Health Insurance: The Potential for Supra-Marginal Cost Pricing," *Economic Inquiry*, 34(2): 341-356, 1996.

89) **Bradford WD**. "The Effects of a Relative Value Reimbursement Scheme on the Medical Market: Lessons from Medicaid," *Review of Industrial Organization*, 10(4): 511-532, 1995.

90) **Bradford WD**, Martin RL. "A Test of the Supplier Induced Demand Hypothesis with Endogenous Quality," *Eastern Economic Journal*, 21(4): 491-504, 1995.

91) **Bradford WD**, Martin RL. "Office Triage and the Physician Labor Supply Curve," *Empirical Economics*, 20(2): 303-325, 1995.

92) **Bradford WD**. "Solo versus Group Practice in the Medical Profession: The Influence of Malpractice Risk," *Health Economics*, 4(2): 95-112, 1995.

93) **Bradford WD**. "National Health Care and Quality of Service: Lessons from Medicaid," *Contemporary Policy Issues*, 11(2): 23-38, 1993.

94) Culbertson WP, **Bradford WD**. "The Price of Beer: Some Evidence from Interstate Comparisons," *International Journal of Industrial Organization*, 9(1991): 275-289.

REPORTS

1) **Bradford WD,** Wager KA, Graber D, Jones WJ, Ward DM, White AW. *South Carolina Medicaid Out Of Home Placement Evaluation Report.* Report to the South Carolina Medicaid Agency. April 2004.

2) **Bradford WD,** Commins JS. *Sickle Cell Disease in the South Carolina Medicaid Population: Incidence, Utilization, and Costs*, Report to the South Carolina Medicaid Agency, December 2003.

3) Bradford WD, Commins JS. *The Impact of Diabetes in the South Carolina Medicaid Population in 2002*, Report to the South Carolina Medicaid Agency, December 2003.

4) **Bradford WD,** Commins JS. *Comparison of Expenditures and Service Utilization: Fee-For-Service Enrollees versus Select Health Members*, Report to the South Carolina Medicaid Agency, September 2003.

5) **Bradford WD,** Commins JS. *Comparison of Expenditures and Service Utilization: Fee-For-Service Enrollees versus Physician Enhanced Payment Enrollees, 2001-2002*, Report to the South Carolina Medicaid Agency, September 2003.

6) **Bradford WD,** Lee FW, Dismuke CE, McIlwain T, Jones WJ, Simpson K. *South Carolina Medicaid DAODAS Prior Authorization Services Outcome Evaluation.* Report to the South Carolina Medicaid Agency, October 2003.

7) **Bradford WD**, Lee FW, Jones W, Kilpatrick AO, Wager KA. *South Carolina Medicaid Postpartum/Infant Home Visit Program Outcome Evaluation*, Report to South Carolina Medicaid Agency, December 2002.

8) **Bradford WD**, Jones WJ, Ward DM. *Report on Service Utilization Comparison of South Carolina Medicaid FFS and Physician Enhanced Payment (PEP) Programs*. Report to South Carolina Medicaid Agency, August 2002.

9) **Bradford WD**. "The Role of Patient Demand in Driving Health Care Spending" BCBSHealth Issues.com, April 29, 2002. http://bcbshealthissues.com/perspectives/healthcarecosts/

10) **Bradford WD**. *Report on Service Utilization Comparison of South Carolina Medicaid FFS and HMO Programs*, Report to South Carolina Medicaid Agency, December 2001.

11) VLBW Research Team (**Bradford WD**, team member). *Very Low Birth Weight Outcomes Project*, Report to South Carolina Medicaid Agency, 2000.

12) Re RN, Krousel-Wood MA, **Bradford WD**, Kleit AN. *The Role of Technology in Reducing Health Care Costs*, Report to Sandia National Laboratories, 1997.

13) Farber SC, **Bradford WD**, Wascom D. *Chemical Waste in Louisiana, 1987: A Summary of Hazardous Waste and Toxic Chemicals*, Report to the Louisiana Department of Environmental Quality, 1989.

EDITORIALS

1) Bradford AC, **Bradford WD**. What Jeff Sessions Gets Wrong About Marijuana. Bloomberg View. 2017 June 27, 2017.

2) Bradford AC, **Bradford WD**. Why Jeff Sessions is going to lose his war against cannabis. Washington Post. 2017 August 1, 2017.

3) **Bradford WD**. "Commentary from a Health Economist: Financing Pediatric Psychology: Buddy, Can You Spare a Dime?" *Journal of Pediatric Psychology*, Vol. 29, No. 1, 2004.

PEER- REVIEWED ABSTRACTS

1) **Bradford WD**, Silvestri G, Zoller J. "Time preference and willingness to pay for preventive health services: an application to lung cancer screening." International Health Economics Association Fourth International Conference, San Francisco, California, June 2003.

2) Kaste LM, Nietert PJ, **Bradford WD**, Oldakowski R, Drury T. "Race/ethnicity variation of usual source of medical care and sealants." *Journal of Public Health Dentistry*, 2001;61(4):235.

3) **Bradford WD**, Kaste LM, Nietert PJ. "Continuity of medical care and its association with dental advice." *Journal of Dental Research.* 2001;80(IADR Abstracts):540.

4) **Bradford WD**. "Direct to Consumer Advertising for Prescription Drugs: A Game Theoretic Model." International Health Economics Association Third International Conference, York, United Kingdom, July 2001.

5) Re RN, Krousel-Wood MA, **Bradford WD**, Kleit AN, Runnels, J. "A Computer Model for the Evaluation of the Economic Impact of Health Care Technology," Association for Health Services Research, Chicago, Illinois, June 1997.

6) Chen YT, **Bradford WD**, Wang Y, Selzer J, Krumholz H. "The impact of acute renal failure on cost in elderly patients with congestive heart failure." International Society for Pharmacoeconomics and Outcomes Research Third Annual International Meeting, Philadelphia, Pennsylvania, May 1998.

7) **Bradford WD**. "Solo Practice Versus Partnerships in the Medical Profession: The Influence of Malpractice Risk," *Proceedings of the Northeast Business and Economics Association Annual Meeting*, Portsmouth, New Hampshire, 1993.

PAPERS PRESENTED

1) Steuart S, Bethel V, **Bradford WD**. "Increased Oversight of Cannabis and Accidental Pediatric Exposure." American Society of Health Economists Annual Conference, St. Louis, MO. June 13, 2023.

2) Shone H, Gupta S, **Bradford WD**. "The Effect of Cannabis Laws on Healthcare Utilization Among Commercially Insured Patients with Pain in the United States." American Society of Health Economists Annual Conference, St. Louis, MO. June 14, 2023.

3) **Bradford WD**, Lozano F. "The Effect of a Large Prescription Opioid Diversion Event on Opioid Mortality in the U.S." Bates While Life Sciences Symposium, Washington DC, May 22, 2023.

4) Lozano-Rojas F, **Bradford WD**. "What a Difference a Visit Makes? Using Dispensary Foot-Traffic to Estimate State and Local Governments' Tax Collections from Cannabis." Association of Public Policy Analysis and Management Annual Conference, Washington DC, November 17-19, 2022.

5) **Bradford WD**, Lozano-Rojas F. "The Effect of Housing Instability on Drug and Alcohol Mortality in the United States." (Keynote) American-European Health Economics Study Group VI, Barcelona, Spain, June 30 – July 1, 2022.

6) Raman S, Maclean JC, **Bradford WD**, Drake C. "Association between Recreational Cannabis Laws and Prescription Opioid Dispensing." American Society of Health Economists 11th Annual Conference, Austin TX, June 26-29, 2022.

7) **Bradford WD**, Ruhm C. "Spillovers from Geographic Variation in Pharmacy Market Structure to the Opioid Epidemic." American Society of Health Economists 10th Annual Conference, Virtual, June 21-23, 2021.

8) **Bradford WD**, Rojas-Lozano F. "The Effect of Homelessness on Accidental Drug and Alcohol Mortality." American Society of Health Economists 10th Annual Conference, Virtual, June 21-23, 2021.

9) Harris SJ, Abraham AJ, Adams GB, Bradford AC, **Bradford WD**. "U.S. Department of Health and Human Services Excluded Doctors Attributed to Fewer Opioid Overdose Deaths, 2000-2016." Association of Policy Analysis and Management Fall Research Conference, Denver, CO, November 7-9, 2019.

10) Nguyen T, **Bradford WD**, Conti R, Simon K. "Does Expansion of Public Health Insurance Affect Prescription Drug Marketing?" Association of Policy Analysis and Management Fall Research Conference, Denver, CO, November 7-9, 2019.

11) Bradford AC, **Bradford WD**. "The Burden of Emergency Police Calls and Opioid Related Mortality." International Health Economics Association Annual Conference, Basel, Switzerland, July 13-17, 2019.

12) Bradford AC, **Bradford WD**. "The Effect of Evictions on Opioid Mortality." American European Health Economics Study Group, Vienna, Austria, July 3-4, 2019.

13) Adams GB, Harris S, Abraham A, Bradford AC, **Bradford WD**. "Throwing Good Money After Bad Docs: The Relationship between Physician Gifts and U.S. Department of Health and Human Services Exclusion." American Society of Health Economics Annual Meeting, Washington DC, June 23-26, 2019.

14) Bradford AC, **Bradford WD**. "The Effect of Evictions on Opioid Mortality." American Society of Health Economics Annual Meeting, Washington DC, June 23-26, 2019.

15) Bradford AC, **Bradford WD**. "The Burden of Emergency Police Calls and Opioid Related Mortality." American Society of Health Economics Annual Meeting, Washington DC, June 23-26, 2019.

16) Bradford AC, **Bradford WD**. "The Burden of Emergency Police Calls and Opioid Related Mortality." Association of Public Policy Analysis and Management Annual Conference, Washington, DC. November 8-10, 2018.

17) Bradford AC, **Bradford WD.** "The Burden of Emergency Police Calls and Opioid Related Mortality." Southern Economic Association Annual Conference, Washington, DC. November 18-20, 2018.

18) Dalton TM, **Bradford WD**. "Better Together: Coexistence of For-Profit and Nonprofit Firms with An Application to Hospice Care." Southern Economic Association Annual Conference, Washington, DC. Nove\mber 18-20, 2018.

19) Doucette MH, **Bradford WD.** "Motivations for Participating in the Gig Economy and Traditional Moonlighting." Western Economic Association International Annual Conference. Vancouver, BC, Canada. June 26-30, 2018.

20) Stomberg C., **Bradford WD**. "Adopting Average Acquisition Cost – Are Drugs Now Cheaper for Medicaid?" American Society of Health Economists Annual Conference, Atlanta, GA. June 10-13, 2018.

21) Nguyen T., **Bradford WD**, Simon K. "The Impact of Opioid Manufacturers Contributions to Doctors on Prescriptions for Opioids in Medicare Part D." American Society of Health Economists Annual Conference, Atlanta, GA. June 10-13, 2018.

22) Abraham AJ, Adams GB, Bradford AC, **Bradford WD**. "County-Level Access to Opioid Use Disorder Medications in Medicare Part D (2010-2015)." American Society of Health Economists Annual Conference, Atlanta, GA. June 10-13, 2018.

23) **Bradford WD**. "Physician Opioid Prescribing in Medicare and Opioid Related Deaths." Association of Public Policy Analysis and Management Annual Conference, Chicago, IL. November 2-4, 2017.

24) **Bradford WD**. "Physician Opioid Prescribing in Medicare and Opioid Related Deaths." Southern Economic Association Annual Conference, Tampa, FL. November 17-19, 2017.

25) Bradford AC, **Bradford WD,** Adams GB, Abraham AJ,. "Medical Marijuana Legislation and Treatment for Opioid Use Disorder in Medicare" Southern Economic Association Annual Conference, Tampa, FL. November 17-19, 2017.

26) Adams GB, Abraham AJ, Bradford AC, **Bradford WD**. "The Effect of Medical Marijuana Legalization on Opioid Overdose Deaths." Southern Economic Association Annual Conference, Tampa, FL. November 17-19, 2017.

27) Bradford, Ashley C., and **W. David Bradford**. "The Impact of Medical Marijuana Legalization On Prescription Medication Use and Costs in Medicare Part D" The Society for Economic Measurement 4th Annual Conference, Massachusetts Institute of Technology, Cambridge, Massachusetts, July 26-28, 2017.

28) Bradford, Ashley C., and **W. David Bradford**. "The Impact of Medical Marijuana Legalization On Prescription Medication Use and Costs in Medicare Part D" European-American Health Economics Research Group Annual Conference, July 6-8, 2017, Oxford, England.

29) Bradford, Ashley C., and **W. David Bradford**. "The Impact of Medical Marijuana Legalization On Prescription Medication Use and Costs in Medicare Part D" Highland Health Economics Symposium, June 18-20, 2017, Lochailort, Scotland.

30) Bradford AC, Bradford WD. "How Does Medical Cannabis Save Money in Medicare and Medicaid?" The Eleventh National Clinical Conference on Cannabis Therapeutics, May 18-20, 2017, Berkeley, CA.

31) Adams GB, Abraham AJ, Bradford AC, **Bradford WD**. "The Effect of Medical Marijuana Legalizations on Drug Poisoning Overdose Deaths." International Health Policy Conference 2017, London School of Economics, London, United Kingdom, February 16-19, 2017.

32) Bradford AC, **Bradford WD**. "Medical Marijuana Legalization and Prescription Medication Use in the Medicaid Population." International Health Policy Conference 2017, London School of Economics, London, United Kingdom, February 16-19, 2017.

33) Abraham AJ, Adam GB, Bradford AC, **Bradford WD**. "Medical Marijuana Legislation and Treatment for Opioid Use Disorder in Medicare." International Health Policy Conference 2017, London School of Economics, London, United Kingdom, February 16-19, 2017.

34) Bullock J, **Bradford WD**. "Identifying Fraud in Home Health Agencies: Using HHA Compare Data to Predict Fraudulent Medicare Payments." Association for Public Policy Analysis and Management 38th Annual Fall Research Conference, Washington, DC, November 2016.

35) Zier ER, **Bradford WD**. "The Effect of State Vaccination Exemption Policies on Pre-K and Kindergarten Enrollment." Association for Public Policy Analysis and Management 38th Annual Fall Research Conference, Washington, DC, November 2016.

36) Bradford AC, and **Bradford WD**. "Medical Marijuana Legalization and Prescription Medication Use in Medicaid." Association for Public Policy Analysis and Management 38th Annual Fall Research Conference, Washington, DC, November 2016.

37) Bradford, AC, **Bradford WD**. "Medical Marijuana Legalization and Prescription Medication Use in Medicaid." Southern Economic Association Annual Conference, Washington, DC. November 19-21, 2016.

38) Adams GB, **Bradford WD** "Risk Tolerance and Preventive Health Behavior." Southern Economic Association Annual Conference, Washington, DC. November 19-21, 2016.

39) Candon M., Bradford WD. "Do Pharmaceutical Companies' Gifts Influence Physicians' Part D Prescribing Behavior?" Southern Economic Association Annual Conference, Washington, DC. November 19-21, 2016.

40) **Bradford WD**, Turner JT, Williams JN. "Off Label Marketing of Pharmaceuticals: Trends and Drivers." Innovation and Behavior in Health Markets, Center for Public Policy Research, Tulane University, New Orleans, LA, February 19, 2016.

41) **Bradford WD**, Dolan P, Galizzi, MM. "Subjective Time Perception and Individual Time Discounting." American Economic Association Annual Meeting, San Francisco CA, January 2016.

42) Bradford AC, **Bradford WD**. "Medical Marijuana Legalization and Prescription Medication Use in the Medicare Population." Emory Georgia Health Economics Research Day, Atlanta GA, December 2015.

43) Bradford AC, **Bradford WD**. "The Effect of Marijuana Legalization on Risky Behaviors and Educational Attainment in U.S. School-Aged Youth" Association for Public Policy Analysis and Management, Miami FL, November 2015.

44) Bradford AC, **Bradford WD**. "Medical Marijuana Legalization and Prescription Medication Use in the Medicare Population." Association for Public Policy Analysis and Management, Miami FL, November 2015.

45) Yarbrough CR, **Bradford WD**. "The Impact of State Prescription Drug Monitoring Programs on Opioid Prescribing Among Medicare Part D Patients." Association for Public Policy Analysis and Management, Miami FL, November 2015.

46) Candon M, Bradford WD. "On- and Off-Label Prescription Use in Children with Attention Deficit/Hyperactivity Disorder." Association for Public Policy Analysis and Management, Miami FL, November 2015.

47) Adams, GB, Bradford WD. "The Effect of WIC Receipt on Prenatal Smoking Cessation: Evidence from the Pregnancy Risk Assessment Monitoring System." Association for Public Policy Analysis and Management, Miami FL, November 2015.

48) Yarbrough CR, **Bradford WD**. "The Impact of State Prescription Drug Monitoring Programs on Opioid Prescribing Among Medicare Part D Patients." Southern Economic Association Annual Meeting, New Orleans LA, November 2015.

49) Bradford AC, **Bradford WD**. "Medical Marijuana Legalization and Prescription Medication Use in the Medicare Population." Southern Economic Association Annual Meeting, New Orleans LA, November 2015.

50) **Bradford WD**, Turner JT, Williams JN. "Off Label Marketing of Pharmaceuticals: Trends and Drivers." American Economic Association Annual Meeting, Boston, MA, January 2015.

51) Bradford AC, **Bradford WD**. "The Effect of Marijuana Legalization on Risky Behaviors and Educational Attainment in U.S. School-Aged Youth." Southern Economic Association Annual Meeting, Atlanta GA, November 2014.

52) Candon M, **Bradford WD**. "Estimating the True Incidence of Autism." Southern Economic Association Annual Meeting, Atlanta GA, November 2014.

53) **Bradford WD**, Paker MM, Williams JW. "Off-Label Use and Welfare in the Market for Pharmaceuticals." Southern Economic Association Annual Meeting, Atlanta GA, November 2014.

54) Adams G, **Bradford WD**. "Initiation and Duration of Breastfeeding Among WIC Participants: Impact of State Policies." Southern Economic Association Annual Meeting, Atlanta GA, November 2014.

55) Yarbrough CR, **Bradford WD**. "State Policies to Curb Opioid Abuse Lead to Improved Pain Outcomes for Medicare Home Health Patients." Southern Economic Association Annual Meeting, Atlanta GA, November 2014.

56) Adams G, **Bradford WD**. "Initiation and Duration of Breastfeeding Among WIC Participants: Impact of State Policies." Association for Public Policy Analysis and Management, Albuquerque NM, November 2014.

57) Bullock J, **Bradford WD**. "The Differential Effect of Bonus Structures on the Likelihood That Physicians Accept New Patients By Insurance Type." Association for Public Policy Analysis and Management, Albuquerque NM, November 2014.

58) Fay DL, **Bradford WD**. "Protecting the "Others": LGBT Specific Bullying Legislation and Education Codes." Association for Public Policy Analysis and Management, Albuquerque NM, November 2014.

59) Atkins DN, **Bradford WD**. "The Effect of State-Level Sex Education Policies on Youth Sexual Behaviors." 14th Annual Southeastern Health Economics Study Group Conference, Tallahassee, FL, October 2014.

60) **Bradford WD**, Turner JT, Williams JN. "Off Label Marketing of Pharmaceuticals: Trends and Drivers." 5th Biannual Conference of the American Society of Health Economists, Los Angeles, CA, June 2014.

61) Atkins DN, **Bradford WD**. "The Effect of State-Level Sex Education Policies on Youth Sexual Behaviors." 5th Biannual Conference of the American Society of Health Economists, Los Angeles, CA, June 2014.

62) Atkins DN, **Bradford WD**, Durrance CP. "The Effect of Emergency Contraception Availability On Pregnancy Intendedness: Evidence From the PRAMS." 5th Biannual Conference of the American Society of Health Economists, Los Angeles, CA, June 2014.

63) Atkins DN, **Bradford WD**, Durrance CP. "The Effect of Emergency Contraception Availability On Pregnancy Intendedness: Evidence From the PRAMS." 83rd Annual Conference of the Southern Economic Association, Washington, D.C., November 2013.

64) Atkins DN, **Bradford WD**, Wilkins VM "Using Representation to Avoid Shirking." European Public Administration Association Conference, Edinburgh, Scotland, September 11-14, 2013.

65) Atkins DN, **Bradford WD**. "Contracting Out Health Services via Regulatory Direction: The Case of Contraceptive Mandates." European Public Administration Association Conference, Edinburgh, Scotland, September 11-14, 2013.

66) Atkins DN, **Bradford WD**. "The Effect of State-Level Sex Education Policies on Youth Sexual Behaviors." Association for Public Policy Analysis and Management Fall Research Conference, Baltimore, MD, November 8-10, 2012.

67) Atkins DN, **Bradford WD**. "Association Between Increased Emergency Contraception Availability and Risky Sexual Practices." Association for Public Policy Analysis and Management Fall Research Conference, Baltimore, MD, November 8-10, 2012.

68) Atkins DN, **Bradford WD**. "The Effect of State-Level Sex Education Policies on Youth Sexual Behaviors." Southern Economic Association Annual Meetings, New Orleans, LA, November 16-18, 2012.

69) Atkins DN, **Bradford WD**. "Association Between Increased Emergency Contraception Availability and Risky Sexual Practices." Southern Economic Association Annual Meetings, New Orleans, LA, November 16-18, 2012.

70) Atkins DN, **Bradford WD**. "Association Between Increased Emergency Contraception Availability and Risky Sexual Practices." The 4th Biennial Conference of the American Society of Health Economists, Minneapolis MN, June 10-13, 2012.

71) Marsh C, **Bradford WD**. "Nonprofit vs. For-profit Competition: A Study of Hospice Care." The 4th Biennial Conference of the American Society of Health Economists, Minneapolis MN, June 10-13, 2012.

72) **Bradford WD**, Dolan P, Galizzi, MM. "Subjective Time Perception and Individual Time Discounting." The 4th Biennial Conference of the American Society of Health Economists, Minneapolis MN, June 10-13, 2012.

73) **Bradford WD**, Jayawardhana J. "The Impact of State Tobacco Control Policies and the Master Settlement Agreement on Smoking Cessation." 8th Annual World Congress of the International Health Economics Association, Toronto, ON, Canada, July 10-13, 2011.

74) **Bradford WD**, Burgess JF. " Time and Risk Preferences in the Choice of Health Insurance Coverage." Southern Economic Association Annual Meetings, Atlanta, GA, November 20-22, 2010.

75) **Bradford WD**, Burgess JF. " Time and Risk Preferences in the Choice of Health Insurance Coverage." Allied Social Sciences Association Annual Meetings, Atlanta, GA, January 3-5, 2010.

76) McCullough JS, **Bradford WD**. "The Effect of Direct to Consumer Advertising on Watchful Waiting: The Case of Statin Ads and Cholesterol Testing Behavior." 7th Annual Southeastern Health Economic Study Group Conference, Atlanta, GA., October 23-24, 2009.

77) **Bradford WD**, Kliet AN. "The Effect of Information on the Timing of Pharmaceutical Treatment for Cholesterol." American Society of Health Economics Annual Meeting, Durham, NC, June 22-25, 2008.

78) **Bradford WD**, Kliet AN. "Advertising Search, Experience and Prestige Characteristics: The Case of Prescription Pharmaceuticals." 5th Annual Southeastern Health Economic Study Group Conference, Chapel Hill, NC., October 19-20, 2007.

79) **Bradford WD**, Dolan P. "A Model of Adaptive Global Utility Maximization." 71st meeting of the Health Economists' Study Group, Brunel University, Uxbridge, United Kingdom, September 5-7, 2007.

80) **Bradford WD**, Kleit AN. "The Impact of DTC on Switching Between Statin Drugs and the Duration of Lipid-Lowering Therapy." International Health Economics 6th World Congress, Copenhagen, Denmark, July 8-11, 2007.

81) **Bradford WD**, Kleit AN. "The Impact of Advertising on Statin Drug Adherence and Attaining LDL Cholesterol Goals" Pharmaceutical Economics and Policy Council, Chicago, IL, January 7-8, 2007.

82) **Bradford WD**, Kleit AN. "The Impact of Advertising on Statin Drug Adherence and Attaining LDL Cholesterol Goals" Federal Trade Commission, Bureau of Economic Research Roundtable on the Economics of the Pharmaceutical Industry. Washington, D.C., October 20, 2006.

83) **Bradford WD**, Zoller J, Silvestri G "Estimating the Effect of Individual Time Preferences on the Use of Disease Screening" Third Annual Southeastern Health Economics Study Group Conference, Miami, FL October 2006.

84) **Bradford, WD** and Kleit, A.N. "The Impact of Advertising on Statin Drug Adherence and Attaining LDL Cholesterol Goals" American Society of Health Economists, Madison, WI. June 4-7, 2006.

85) Wosinska, M, and **Bradford, W.D.** "Direct-to-Consumer Advertising, Media Publicity and Utilization of Prescription Drugs" American Society of Health Economists, Madison, WI. June 4-7, 2006.

86) **Bradford, WD**, Dismuke CE, Steyer T, Zoller J. "The Use of Detection Controlled Estimation to Estimate Physician Prescribing and Patient Purchase of Pharmaceuticals in Administrative Data for Asthma." International Health Economics Association 5th World Congress, Barcelona, Spain, July 2005.

87) **Bradford, WD**. "The Impact of Direct to Consumer Advertising for Statins on Physician Prescribing Behavior: International Health Economics Association 5th World Congress, Barcelona, Spain, July 2005.

88) **Bradford, WD**. "The Impact of Direct to Consumer Advertising on Prescription Drugs: FDA Hearing on Direct to Consumer Advertising, Washington DC, November 1, 2005.

89) **Bradford WD**, Jones WJ, Ward DM. "Medicaid and Managed Primary Care: The Role of South Carolina PEP" American Public Health Association 132nd Annual Meeting, Washington, D.C., November, 2004.

90) **Bradford WD,** Kleit AN, Neitert PJ, Steyer T, McIlwain T, Ornstein S. "The Impact of Direct to Consumer Advertising for Prescription Drugs on Physician Prescribing Behavior for the Treatment for Osteoarthritis." American Economic Association Annual Meetings, Philadelphia, PA, January 2005.

91) **Bradford WD**, Kleit AN, Neitert PJ, Steyer T, McIlwain T, Ornstein S. "The Impact of Direct to Consumer Advertising for Prescription Drugs on Physician Prescribing Behavior for the Treatment for Osteoarthritis" Second Annual Southeastern Health Economics Study Group Conference, Atlanta, GA, November 2004.

92) **Bradford WD**, Silvestri G, Zoller J. "Time preference and willingness to pay for preventive health services: an application to lung cancer screening." American Health Economics Conference, Birmingham, Alabama, April, 2004.

93) Bradford WD, Bearden L. "The impact of diabetes: Costs and resource utilization." American Health Quality Association Technical Meeting, New Orleans, Louisiana, March 2004.

94) **Bradford WD**, Silvestri G, Zoller J. "Time preference and willingness to pay for preventive health services: an application to lung cancer screening." International Health Economics Association Fourth International Conference, San Francisco, California, June 2003.

95) **Bradford WD**, Mobley L. "Employment-Based Health Insurance and the Effectiveness of Intra-Firm Competition Between Insurance Providers." Eleventh Annual Health Economics Conference, Washington, D.C., June 2000**.**

96) **Bradford WD**. "Direct to Consumer Advertising for Prescription Drugs: A Game Theoretic Model." Eleventh Annual Health Economics Conference, Washington, D.C., June 2000.

97) **Bradford WD**, Krumholz HM. "The Effect of Managed Care Penetration on the Treatment of Acute Myocardial Infarction in the Fee-For-Service Medicare Population." Ninth Annual Health Economics Conference, Ithaca, New York, June 1998.

98) Chen YT, **Bradford WD**, Wang Y, Selzer J, Krumholz H. "The impact of acute renal failure on cost in elderly patients with congestive heart failure." International Society for Pharmacoeconomics and Outcomes Research Third Annual International Meeting, Philadelphia, Pennsylvania, May 1998.

99) **Bradford WD**, Martin RN. "A Theory of Referrals: Applications to the Medical Profession," Fifth Northeast Regional Health Economics Research Symposium, Newport, RI, August 1997.

100) Re RN, Krousel-Wood MA, **Bradford WD**, Kleit AN, Runnels J. "A Computer Model for the Evaluation of the Economic Impact of Health Care Technology," Association for Health Services Research, Chicago, Illinois, June 1997.

101) **Bradford WD**, Kleit AN, Krousel-Wood MA, Re RN. "Stochastic Frontier Estimation of Cost Models within the Hospital," Advanced Workshop in Regulation and Competition: 16th Annual Conference, Lake George, New York, May 1997.

102) **Bradford WD**. "Pregnancy and the Demand for Cigarettes," Southern Economic Association Annual Meeting, Washington, D.C., November 1996.

103) **Bradford WD.** "The Effect of State Medicaid Expenditures on the Quantity and Quality of Children Demanded by Welfare-Dependent Households," Econometric Society Session at the Allied Social Sciences Association Annual Meetings, San Francisco, California, 1996.

104) DeFelice LC, **Bradford WD**. "Relative Inefficiencies Between Solo and Group Practice Physicians," Southern Economic Association Annual Meeting, New Orleans, Louisiana, 1995.

105) **Bradford WD**. "Optimal Physician - Hospital Admission Privilege Contracting," Southern Economic Association Annual Meeting, New Orleans, Louisiana, 1995.

106) **Bradford WD**. "The Effect of State Medicaid Expenditures on the Quantity and Quality of Children Demanded by Welfare Dependent Households," Southern Economic Association Annual Meeting, New Orleans, Louisiana, 1995.

107) **Bradford WD**. "Solo Practice versus Partnerships in the Medical Profession: The Influence of Malpractice Risk," Econometric Society Session at the Allied Social Sciences Association Annual Meetings, Boston, Massachusetts, 1993.

108) **Bradford WD**. "The Efficiency of Employment-Based Health Insurance: The Potential for Supra-Marginal Cost Pricing," Southern Economic Association Annual Meeting, New Orleans, Louisiana, 1993.

109) **Bradford WD**. "Solo Practice Versus Partnerships in the Medical Profession: The Influence of Malpractice Risk," Northeast Business and Economics Association Annual Meeting, Portsmouth, New Hampshire, 1993.

110) **Bradford WD**. "The Effects of a Relative Value Reimbursement Scheme on the Medical Market: Lessons from Medicaid," Southern Economic Association Annual Meeting, Washington, D.C., 1992.

111) **Bradford WD**. "National Health Care and Quality of Service: Lessons from Medicaid," Western Economic Association, International Annual Meeting, San Francisco, California, 1992.

112) **Bradford WD**. "A Structural Comparison of the Soft Drink and Malt Beverage Industries," Western Economic Association, International Meetings, San Diego, California, 1990.

113) **Bradford WD**. "A Cost Benefit Study of Mandated Ethanol-Gasoline Blends," (with C. Dahl), Allied Social Sciences Annual Meetings, Atlanta, Georgia, 1989.

114) **Bradford WD**, Dahl C. "Preliminary Report on the Effectiveness of a Mandatory Gasohol Program on Automotive Exhaust Emissions to the Year 2000," (with C. Dahl), Southern Economic Association Meetings, Orlando, Florida, 1989.

INVITED LECTURES AND OTHER PRESENTATIONS

1) The Effect of a Large Prescription Opioid Diversion Event on Opioid Mortality in the U.S." Department of Economics Seminar Series, Johannes Kepler University, April 26, 2023.

2) "The Effect of a Large Prescription Opioid Diversion Event on Opioid Mortality in the U.S." Department of Economics Seminar Series, University of Essen, April 24, 2023.

3) "The Effect of a Large Prescription Opioid Diversion Event on Opioid Mortality in the U.S." Department of Resource Economics Seminar Series, University of Massachusetts – Amherst, March 8, 2023.

4) "The Effect of Homelessness on Accidental Drug and Alcohol Mortality." Department of Economics Seminar Series, University of New Hampshire, October 29, 2021.

5) "The Effect of Evictions and Homelessness on Accidental Drug and Alcohol Mortality." Department of Health Care Management, Wharton School of Economics, University of Pennsylvania. October 30, 2020.

6) "The Effect of State and Local Housing Policies on County-Level Eviction Rates in the United States, 2004-2016." Department of Risk and Insurance Seminar Series, University of Wisconsin – Madison. September 18. 2020.

7) "The Association between Housing Policy, Homelessness, and Accidental Drug and Alcohol Mortality." Alcohol Research Group, University of California – Berkeley. September 15, 2020.

8) "The Impact of COVID-19 on the U.S. Health Care Sector." At European Commission Workshop on Covid-19 pandemic: Challenges and opportunities for the healthcare systems (online). July 15, 2020.

9) "Testimony Before Georgia State House Medical Cannabis Working Group." State of Georgia General Assembly Committee. October 5, 2018.

10) "Medical Cannabis, Opioid Use, and the Opioid Mortality Crisis: Evidence for Kentucky." Foundation for a Healthy Kentucky, Howard L. Bost Memorial Health Policy Forum. Lexington, KY, September 24, 2018.

11) "Economic Issues in the Legalization of Cannabis." Second Annual Ireland Master Class in Health Economics. Queens University Belfast, Northern Ireland, United Kingdom. April 3-6, 2018.

12) "Medical Cannabis Policies and Health." Washington State Medical Commission Conference, October 4-5, 2017.

13) "Medical Cannabis in Georgia: Testimony Before Georgia State House Medical Cannabis Working Group." State of Georgia General Assembly Committee. November 28, 2017.

14) "Medical Cannabis in Georgia: Testimony Before Georgia State House Medical Cannabis Working Group." State of Georgia General Assembly Committee. February 20, 2017.

15) "Medical Cannabis in Georgia: Testimony Before Georgia State House Medical Cannabis Working Group." State of Georgia General Assembly Committee. February 1, 2017.

16) "Medical Marijuana Legalization and Prescription Medication Use in the Medicare Population." Health Economics Research Group (HERG) at the Centers for Disease Control and Prevention, Atlanta GA, October 19, 2016.

17) "Medical Marijuana Laws Reduce Prescription Medication Use In Medicare Part D." State Epidemiological Workgroup (SEOW), Vermont Department of Health, Division of Alcohol and Drug Abuse Programs, (via Skype) July 21, 2016.

18) "Medical Marijuana Legalization and Prescription Medication Use in the Medicare Population." Triangle Health Economics Workshop, University of North Carolina – Chapel Hill, April 2016.

19) "Medical Marijuana Legalization and Prescription Medication Use in the Medicare Population." School of Public Health Seminar Series, Texas A&M University, December 2015.

20) "Anti-Kickback Statute." Keynote panel discussion. Bates White Life Sciences Symposium. Washington, DC. June 8-9, 2015.

21) "Impact of FDA Actions, DTCA, and Public Information on the Market for Pain Medication." Department of Economics Seminar Series, University of New Hampshire, May 4, 2012.

22) "The Impact of State Tobacco Control Policies on Smoking Cessation Attempts." Division of Health Policy & Management Seminar Series, University of Minnesota School of Public Health, March 30, 2012.

23) "The Impact of Public Information and FDA Issued Warnings on the Use of Prescription Pharmaceuticals in Primary Care." FDA Social Sciences Network Quarterly Meeting, Food and Drug Administration, Hyattsville, MD, June 20, 2011.

24) "Getting Used to It: The Adaptive Global Utility Model." Division of Health and Social Care, London School of Economics, London, U.K., November 11, 2010.

25) "The impact of public information and FDA issued warnings on the use of antidepressants in primary care." Department of Economics Seminar Series, Florida State University, Tallahassee FL, September 23, 2010.

26) "Time and Risk Preferences in the Choice of Health Insurance Coverage." Pepper Center Seminar Series, Florida State University, Tallahassee FL, September 23, 2010.

27) "Time and Risk Preferences in the Choice of Health Insurance Coverage." Lister Hill Center Seminar Series, University of Alabama at Birmingham, Birmingham, AL, September 8, 2010.

28) "Healthcare Reform and the Pharmaceutical Industry What Are the Implications?" Keynote Lecture, PharmaMarketing Summit. Doral Golf Resort & Spa, Miami, FL, May 10-12, 2010.

29) "Time and Risk Preferences in the Choice of Health Insurance Coverage." Department of Health Policy Seminar Series, George Washington University, Washington, D.C. April 23, 2010.

30) "Competition in the Pharmaceutical Industry: At a Crossroads?" Panel participant, Bates White Healthcare Law and Economics Workshop, Washington D.C., October 29, 2009.

31) "The Role of Time Preferences in Prevention - Unrealized Barriers." Keynote Lecture, 2009 Kaafee Billah Memorial Award Ceremony. Centers for Disease Control, Atlanta, GA, September 17th, 2009.

32) "Can Credence Advertising Effects Be Isolated? Can They Be Negative?: Evidence From Pharmaceuticals", Department of Economics, Georgia State University, Atlanta, GA. August 21, 2009.

33) "Can Credence Advertising Effects Be Isolated? Can They Be Negative?: Evidence From Pharmaceuticals." Department of Economics, University of Georgia, Athens, GA; October 9, 2008.

34) "Advertising Search, Experience and Credence Characteristics: The Case of Prescription Pharmaceuticals." Department of Economics, Rice University, Houston, TX; April 1, 2008.

35) "The Effect of Direct to Consumer Television Advertising on the Timing of Treatment." Leonard Davis Institute Research Seminar, University of Pennsylvania, Philadelphia, PA; April 18, 2008.

36) "Advertising Search, Experience and Prestige Characteristics: The Case of Prescription Pharmaceuticals." Department of Economics Seminar Series, University of South Carolina, Columbia, SC, October 5, 2007.

37) "Advertising Search, Experience and Prestige Characteristics: The Case of Prescription Pharmaceuticals." Department of Economics Seminar Series, College of Charleston, Charleston, SC, October 5, 2007.

38) "The Impact of Direct to Consumer Advertising on Outcomes of Statin Therapy," Lister Hill Center Seminar Series, Birmingham, AL, March 8, 2006.

39) "The Impact of Direct to Consumer Advertising on Prescription Drugs:" FDA Hearing on Direct to Consumer Advertising, Washington DC, November 1, 2005.

40) "The Impact of Direct to Consumer Advertising for Prescription Drugs on Physician Prescribing Behavior for the Treatment for Osteoarthritis." Department of Economics Seminar Series, University of North Carolina – Greensboro, October 2004.

41) "Time preference and willingness to pay for preventive health services: an application to lung cancer screening." Atlanta Federal Reserve Bank Seminar Series, Federal Reserve Bank, Atlanta, Georgia, July 2004.

42) "Pregnancy and the Demand for Cigarettes" Economics Spring 2001 Seminar Series, Department of Economics, University of South Carolina, February 2001.

43) "Pregnancy and the Demand for Cigarettes" Lister Hill Center for Health Policy 1999-2000 Seminar Series, University of Alabama at Birmingham, July 2000.

44) "Report on: Very Low Birth Weight Outcomes Project" (with L. Beardon, L. Szwebka, C. Gibson) South Carolina State Committee on Obstetrics and Gynecology, January 2000; and South Carolina Medical Association Committee on Perinatal Regionalization, January 2000.

45) "Cost-Benefit and Cost-Effectiveness Analysis Under Review" 4th Annual Practical Issues in Outcomes Measurement and Management Continuing Medical Education, New Orleans, Louisiana, April 1999.

46) "Tools of the Trade – Resources for Economic Assessment" 4th Annual Practical Issues in Outcomes Measurement and Management Continuing Medical Education, New Orleans, Louisiana, April 1999.

47) "How to Use the Medical Literature in Practice: Economic Perspectives" 4th Annual Practical Issues in Outcomes Measurement and Management Continuing Medical Education, New Orleans, Louisiana, April 1999.

48) "Cost-Effectiveness and the Economics of Health Care," 3rd Annual Practical Issues in Outcomes Measurement and Management Continuing Medical Education, New Orleans, Louisiana, April 1998.

49) "Cost Effectiveness / Cost Benefit Analysis in Technology Assessment." 3rd Annual Practical Issues in Outcomes Measurement and Management Continuing Medical Education, New Orleans, Louisiana, April 1998.

50) "Pregnancy and the Demand for Cigarettes." Yale University, Department of Epidemiology and Public Health Seminar Series, November 1997.

51) "Cost Effectiveness and the Economics of Health Care," 2nd Annual Practical Issues in Outcomes Measurement and Management Continuing Medical Education, New Orleans, Louisiana, April 1997.

52) "The Effectiveness of Catheterization on Mortality from Acute Myocardial Infarction when Controlling for Selection Effects in an Elderly and Non-Elderly Population." Yale University, Department of Epidemiology and Public Health Seminar Series, December 1996.

53) "Medicaid Generosity and the Size of Welfare Dependent Families," Boston University / MIT / Harvard Health Economics Seminar, February 1996.

Grants and Contracts

CURRENTLY ACTIVE

1) "The Effect of Medical Cannabis Laws on Health Care Use in Insured Populations with Pain – S1" (WD Bradford, Principal Investigator). National Institute of Drug Abuse Research (Grant No. 3R01DA047365-03S1). *This study will examine the effect of the COVID-19 pandemic on postpartum women's pain-related healthcare utilization, with specific focus on the prescription of*

opioid analgesics at hospital discharge after delivery and the subsequent six-month postpartum period. In addition, we will build on preliminary evidence that there is substitution away from opioid analgesic prescriptions in states that implement recreational and medical cannabis laws. Total project budget: $569,151. 7/1//2021--6/31/22. Role: PI (10% effort).

2) "The Effect of Medical Cannabis Laws on Health Care Use in Insured Populations with Pain" (WD Bradford, Principal Investigator). National Institute of Drug Abuse Research (Grant No. 1R01DA047365-01A1). *This study will build on preliminary evidence that there is substitution away from opioid analgesic prescriptions in states that implement medical cannabis laws, and will provide the first longitudinal, patient-level analysis of the relationship between these laws and pain-related healthcare utilization*. Total project budget: $3,393,042. 7/1//2019--6/31/24. Role: PI (33% effort).

COMPLETED AS PRINCIPAL INVESTIGATOR

1) "The Impact of State Opioid Regulation on Pain Management in Medicare Patients" (WD Bradford, Principal Investigator) Robert Wood Johnson Foundation, Public Health Law Research Program. *This grant evaluates the impact of prescription drug monitoring programs, particularly those aimed at affecting opioid use, on pain outcomes for Medicare patients in nursing home, home health, and hospice care*. Total project budget: $147,869. 11/1/1004 – 5/1/2016. Role: Principle Investigator.

2) "The Role of Discounting and Time Perception in Savings Decisions" Swiss Re (Paul Dolan, PI). *The aim of this project is to understand how people's discount rates relate to their financial behaviour. A better understanding of what determines discount rates, how stable they are, and whether interventions might change them, are central concerns for anyone interested in financial behaviours, education and capability.* Total project budget: $25,000 (varying percent effort); September 1, 2013 – March 30, 2014. Role: Co-Investigator.

3) "Effect of FDA Boxed Warnings and Public Information on Pharmaceutical Use (continuation)" (Principal Investigator, R01 HS011326-03) Agency for Healthcare Research and Quality. *The goals of this project are to determine whether FDA Black Box Warnings are effective tools at post-marketing drug safety improvement given the existence of clinical publications, media coverage, and direct to consumer pharmaceutical advertising.* 09/07/07 – 08/31/11. $1,172,609 (25% effort).

4) "Clinical efficacy and potential cost offsets for state Medicaid programs from increased Mirena utilization." (Principal Investigator) Source: Bayer/Berlex (Contract), July 2007 – June 2008. $70,000.

5) "State Use of Master Settlement Agreement Funds: Developing a Report Card" (Local Principal Investigator). Department of Defense. *The goals of this project are to assess the use of funds awarded to each state as a consequence of the Master Settlement Agreement, and the effectiveness of that use in reducing teen smoking.* 8/1/06 – 7/30/09. $210,259 (5% effort).

6) "Public Health and Economic Implications of Free Nicotine Replacement" (Local Principal Investigator). Department of Defense. *The goals of this research are to estimate the health effects and budgetary impacts of programs to offer free nicotine replacement therapy to encourage smoking cessation.* 8/1/06 – 7/30/09. $289,221 (5% effort).

7) "DTC Advertising Effect on Adherence to Statin Therapy" (Principal Investigator) National Heart Lung and Blood Institute (NIH). *The goal of this research is to assess the effect of direct to consumer advertising for prescriptions of statins on the adherence and cost effectiveness of pharmacological care for hypercholesterolemia*. 07/01/04 – 05/31/07; $714,520. (30% effort).

8) "Impact Study of the New Hampshire Employment Program" (Principal Investigator). New Hampshire Department of Health and Human Services / United States Agency for Families and Children. *Project compares the duration on, duration off and recidivism rates for welfare recipients in New Hampshire before and after a state-wide reform proposal was implemented. In addition, the project examines the caseload for the state as a whole over the 1985 to 1999 time period.* 02/01/97 – 10/31/99; $500,000 (35%).

9) "Incidence of Cross-System Medical Usage: Veterans Use of the VA and Fee-for-Service Medicare" (Principal Investigator). Northeast Program Evaluation Center – Veterans Administration. *Project compares the incidence of cross-system use by veterans suffering acute myocardial infarction in 1995. Implications of multi-system use, including total cost of care, quality of care and outcomes are also evaluated.* 10/01/98 – 09/30/99; $15,478 (15%).

10) "Assessing the Impact of Increased Dental Medicaid Reimbursement Rates on the Utilization and Access to Dental Services in South Carolina." (Principal Investigator); Health Services Research Administration. *The goal of this research is to assess the impact of increased dental Medicaid reimbursement rates on the utilization and access to dental services in South Carolina.* 08/15/00 – 12/15/01; $125,000 (15% effort).

11) "TeleHealth Deployment Research Testbed – MUSC Component." (Principal Investigator); Submitted to the Health Services Research Administration. *The goal of this project is to establish a testbed for telemedicine demonstration projects, to standardize assessment mechanisms for new telemedicine technologies*. 08/01/00 – 07/30/01; $400,000, (40% effort).

12) "TeleHealth Deployment Research Testbed, Phase II – MUSC Component." (Principal Investigator); Health Services Research Administration. *The goal of this project is to establish a testbed for telemedicine demonstration projects, to standardize assessment mechanisms for new telemedicine technologies*. 08/01/01 – 07/30/02; $280,000, (35% effort).

13) "Postpartum/Infant Home Visit Program Outcome and PEP Program Outcome Evaluation" (Principal Investigator) South Carolina Medicaid Agency. *The goal of this project is to determine the factors that affect the success of the postpartum home visit program.* 04.01.02 – 7/30/02; $170,702.

14) "Out of Home Placement Program and DAODAS Prior Authorization System Outcome Evaluation" (Principal Investigator) South Carolina Medicaid Agency. *The goal of this project is to determine the factors that affect the success and efficiency of the Out of Home Placement Program and the DAODAS Prior Authorization System.* 08/01/02 – 7/30/03. $400,000 (16% effort).

15) "Impact of Asthma, Psychoses, Smoking and Obesity on SC Medicaid Programs Evaluation" (Principal Investigator) South Carolina Medicaid Agency. *The goal of this project is to determine how specific disease clusters are treated, and how these treatments affect the SC Medicaid System.* 08/01/03 – 7/30/04. $400,000 (10% effort).

16) "Impact of Direct to Consumer Pharmaceutical Marketing" (Principal Investigator) AHRQ. *The goal of this research is to assess the effect of direct to consumer advertising for prescriptions of cox-2 inhibitors and statins on the costs and cost effectiveness of pharmacological care for osteoarthritis and hypercholesterolemia*. 06/01/03 – 05/31/05; $408,172. (30% effort).

17) "Utilization and Cost of Health Services by CDU" (Principal Investigator) NIDA. *The goal of this research is to develop new methods to assess the costs of health care associated with drug and other substance abuse.* 08/01/03 – 07/30/07. $714,520 (25% effort).

18) "Medicaid Program Evaluation: HMO, Sickle Cell Disease, and Diabetes" (Principle Investigator). Carolina Medical Review. *The goal of this research is to evaluate the HMO program within the SC Medicaid system, and to evaluate guideline adherence for Sickle Cell disease and Diabetes.* 06/01/03 – 12/31/03; $40,000 (hourly effort).

19) "17th Annual Health Economics Conference" (Principal Investigator, 1R13HS016352-01). DHHS/Agency for Healthcare Research and Quality. *The goals of this conference are to (1) advance the policy applicability of health economics; (2) improve the policy relevance of empirical health economics; and (3) develop the next generations of health economic scholars.* 03/17/06 – 03/16/07. $52,560 (5% effort).

20) "A Project to Estimate the Cost-effectiveness and Budgetary Impact of Student in Portugal using the Model of the Treatment of Metastic Renal Cell Carcinoma (mRCC)." Source: Datamedica (Contract), 1/1/06 – 12/31/06. $38,800.

21) "A Project to Estimate Budget Impact and Cost-effectiveness of Macugen in Portuguese Patients with Age-Related Macular Degeneration." (Principal Investigator) Source: Datamedica (Contract), 1/1/06 – 12/31/06. $28,100.

COMPLETED AS CO-INVESTIGATOR

1) Opioid Prescribing in Medicaid: Healthcare Utilization and Deaths from Overdose" (Jayani Jayawardhana and Matthew Perri, Principle Investigators). National Institute of Drug Abuse Research (Grant No. R01DA039930); Total project budget: $675,000. 4/1/16--3/31/19. Role: Co-Investigator (5% effort).

2) "The Stages of Implementation Completion for Evidence-Based Practice" (Lisa Saldana, Principle Investigator) National Institutes of Mental Health. *This grant evaluates use of the Stages of Implementation (SIC) for 3 evidence based practices for children's mental health. Using a mixed-methods design, the SIC is being adapted for these practices and universal/common implementation processes are being considered across practices.* 12/01/12–11/30/16. Role: Co-Investigator

3) "Translational Drug Abuse Prevention Center " (Chamberlain and Fisher, PI). *Specialized Center grant focused on the translation of drug abuse prevention in child welfare involved populations and programs. Projects will serve as a national resource for multidisciplinary, scientifically innovative and synergistic Type 1 and II translational research in drug abuse that seeds future research, practice, and policy in the child welfare system*. NIDA (P50 DA035763-01); 7/13-6/18. Role: Co-Investigator.

4) "The Stages of Implementation Completion for Evidence-Based Practice" (Saldana, PI) *This grant evaluates use of the Stages of Implementation (SIC) for 3 evidence based practices for children's mental health. Using a mixed-methods design, the SIC is being adapted for these practices and universal/common implementation processes are being considered across practices*. NIDA (1 R01 MH097748); 12/01/12–11/30/16. Role: Co-Investigator.

5) "Teens' Risk During Transition: Preventing Drug Use, HIV, and School Problems" (Chamberlain, PI). *Randomized clinical trial evaluating an intervention for middle school aged youth in foster care, at-risk for substance use and HIV, with consequential school problems throughout the San Diego school system*. NIDA (R01DA032634-01); 2/2012-2/2017. Role: Co-Investigator.

6) "Juvenile Justice Girls: Pathways to Adjustment and System Use in Young Adulthood" (Leve, PI). *Long-term follow-up of a sample of girls who were placed in the foster care system during adolescents. Outcomes focus on long-term treatment outcomes and evaluation of the cost effectiveness of MTFC*. NIDA (R01 DA024672-01A1); 02/15/09-02/14/13. Role: Co-Investigator.

7) "Center for Drug Abuse Prevention in the Child Welfare System" (Reid and Chamberlain, PI). *Center of Excellence grant focused implementation of evidence-based practice, specification of conceptual models, and reduction of drug abuse and related problems in child welfare populations.* NIDA (1P30DA023920-01A1); 09/08-06/13. Role: Co-Investigator.

8) "Administrative Supplement to Conduct Economic Evaluation " (Chamberlain, PI). Economic evaluation of two implementation strategies for implementing MTFC in California and Ohio systems. NIDA (R01 MH076158-05S1); 01/11-01/12. Role: Co-Investigator.

9) "Evaluating the Effect of Child Trust Funds on Savings Rates in the United Kingdom" Swiss Re (Co-Investigator; Paul Dolan, PI). *The goal of this project is to evaluate the impact of the Child Trust Funds, a U.K. government program that created long terms savings accounts for all children born after September 2002, on the savings behaviors of U.K. families.* Total project budget: $25,000 (varying percent effort); March 1, 2013 – September 30, 2013.

10) "Testing EBP and Organization Effects in Rural Appalachia" (Co-Investigator) NIMH. *The goal of this project is to assess the effect of combining organization change interventions with multisystemic therapy for the effectiveness of social services support in rural Appalachia.* 07/01/03 – 06/30/07 (10% effort).

11) "Substance Abusing Delinquents: 5-Year Outcomes of RCT" (Health Economist), National Institute of Mental Health. *The goal of this study is to attenuate deleterious long-term outcomes and cost in a sample of 200 chronic juvenile offenders meeting diagnostic criteria for alcohol or drug abuse or dependence.* 09/01/04 – 08/31/09. (5% effort).

12) "Alcohol/Drug Abusing Delinquents: 5-Year Outcomes of RCT" (Health Economist), National Institute of Mental Health. *The goal of this study is to attenuate deleterious long-term outcomes and cost in a sample of 200 chronic juvenile offenders meeting diagnostic criteria for alcohol or drug abuse or dependence.* 04/01/03 – 03/31/08. $ 1,941,755 (10% effort).

13) "The Effectiveness of Catheterization on Mortality from Acute Myocardial Infarction when Controlling for Selection Effects in an Elderly and Non-Elderly Population," (Co-Investigator) under contract for the State of Connecticut. *Project investigates the consequences of expanding coronary catheterization capacity to all hospitals in the state of Connecticut.* 01/01/96 – 12/31/96; $20,000.

14) "The Role of Technology in Health Care Costs," (Co-Investigator), Department of Energy / Sandia National Laboratories Contract AN - 6271. *Project develops a general methodology to assess the full cost implications of technological innovation in health care from a social perspective.* 05/01/95 – 04/30/97; $1,200,000 (varying percent effort).

15) "Extension of: 'The Role of Technology in Health Care Costs'," (Co-Investigator), Department of Energy / Sandia National Laboratories Contract AN - 6271. *Project assesses the cost implications for the adoption of remote medicine (telemedicine) technologies to provide health care to various populations. Project also undertakes cost effectiveness simulations.* 09/01/97 – 08/31/99; $1,000,000 (varying percent effort).

16) "Extension of: 'The Role of Technology in Health Care Costs'," (Co-Investigator), Department of Energy / Sandia National Laboratories Contract AN - 6271. *Project assesses the cost implications for the adoption of remote medicine (telemedicine) technologies to provide health care to various populations. Project also undertakes cost effectiveness simulations.* 09/01/99 – 08/31/01; $800,000 (varying percent effort).

17) "MST vs. Hospitalization: 2-Year follow-up for Outcomes" (Co-investigator). National Institute of Mental Health. *The major goal of this project is to assess the economic benefits of MST treatment vs. standard treatment for children with mental health crises in terms of reducing costs associated with institutionalization.* 7/1/99 – 6/30/01; $601,819, (5%).

18) "CMR – Very-Low Birth Weight Birth" (Co-Investigator). Carolina Medical Review *This project will evaluate the characteristics of very-low birth weight births, and the factors which contribute to adverse outcomes, readmission and high cost.* 04/01/99 – 05/31/99; $8,825 (20%).

19) "MST with Alcohol Abusing Delinquents: Outcomes and Costs" (Co-Investigator). National Institute of Mental Health. *The major goal of this project is to assess the use of MST (non-institutional) therapy for delinquent adolescents compared to standard institutionalization.* 7/1/99 – 6/30/04; $2,982,078, (5% effort).

20) "Randomized Clinical Trial of Juvenile Drug Court and MST" (Co-Investigator). National Institute on Drub Abuse. *The major goal of this project is to assess the use of MST in conjunction with juvenile drug court enhances the clinical and cost-related outcomes for drug-using delinquent adolescents.* 9/01/99 – 8/31/04, $1,740,207, (5.2% effort).

21) "Understanding and Eliminating Health Disparities in Blacks" (Co-Investigator). Approved by Agency for Healthcare Research and Quality. *The goal of this research is to explore the many factors that lead to and perpetuate disparities in health outcomes among the African-American population of the state of South Carolina.* $12,118,398 (14.83% effort).

22) "Disease and Stroke in Primary Care Practice" (Co-Investigator); Submitted to Agency for Health Care Policy and Research. *The major goal of this project is to determine whether academ8ic detailing with respect to the use of quality improvement initiatives based on electronic medical record systems can improve adherence to clinical guidelines*. $864,045 (9.88% effort).

23) "Feasibility of Remote Video Outpatient Clinical Visits in Cancer Patients Receiving Palliative Care" (Service Center Leader), Department of Defense. *The major goal of this project is to assess the utility of telemedicine for patients receiving palliative care for cancer*. 7/1/01 – 6/31/03, award for service center: $7,000.

24) "Assessing Barriers for the Screening of Lung Cancer in Rural Populations: A Telephone and Written Survey" (Service Center Leader), Department of Defense. *The goal of this project is to better understand barriers-to-care for patients with lung cancer living in rural and medically underserved areas.* 12/01/01 – 11/30/02 , $149,964 (20% effort) .

25) "Schools as a Context for Mental Health" (Co-Investigator) NIH/NIMH. *The goal of this study is to investigate interdisciplinary approaches, and the cost effectiveness of those interventions, for providing mental health services to children within the educational infrastructure*. 09/01/02 – 08/31/05 (4% effort).

26) "Assessing Barriers for the Screening of Lung Cancer in Rural Populations: Physician Acceptance" (Service Center Leader), Department of Defense. *The goal of this project is to better understand barriers-to-care for patients with lung cancer living in rural and medically underserved areas.* 01/01/03 – 12/31/05 , $300,000 (20% effort).

Professional Service

ORGANIZATIONS

- *Board Member:* International Health Economics Association.
- *Advisory Board Member:* American Society of Health Economists.
- *Co-Editor*: Health Economics Letters, peer-reviewed journal published by John Wiley and Sons.
- *Associate Editor*: Health Economics, peer-reviewed journal published by John Wiley and Sons.
- *Steering Committee Chair:* Southeastern Health Economics Study Group.
- *Steering Committee Member:* Annual Health Economics Conference.
- *Co-Chair*: International Health Economics Association scientific committee for ASSA sessions, 2011.

NATIONAL POLICY SESSIONS

- Writer for American College of Cardiology Bethesda Conference #33, Preventative Cardiology, December 2001.

SERVICE TO THE STATE OF GEORGIA

- Member, Governor's Health Exchange Advisory Committee, 2011-present.

STUDY SESSION PARTICIPATION AND PROPOSAL REVIEW

- Member NIH Special Emphasis Panel, "Integrating Comparative Effectiveness Research Findings into Care Delivery through Economic Incentives". June 2011.
- Permanent Member, Review Committee for National Institutes of Health, Health Services Organization and Delivery (HSOD) Section. October 2008-2012.
- Review Committee for AHA Pharmaceutical Roundtable (PRT) Outcomes Research Center Award Study Section, American Heart Association, June 2008.
- Review Committee for National Institutes of Health, Health Services Organization and Delivery (HSOD) Section. June 2007, June 2008.
- Review Committee for National Institute on Mental Health, Services Research Section. February 7, 2007.
- Review Committee for National Institute on Aging, Program Project Section (ZAG1 ZIJ-9 (O3)). June 2006.
- Review Committee for American Heart Association, Outcomes Study Section, October 2001.
- Review Committee for Agency for Health Care Policy and Research, HS-00-001: Health Care Markets and Managed Care, Rockville MD, February 2000.
- Reviewer for National Science Foundation, Economics Program (Program Announcement: GPG, NSF 99-2), November 1999, November 2003, March 2006.
- Review Committee for National Institute for Alcohol and Alcohol Abuse, ZAA1 FF: Health Services Research on Alcohol-Related Problems, Bethesda, MD, July 1997.
- Review Committee for Centers for Disease Control and Prevention, PE Fellows Class, March 2004, March 2005, March 2006, March 2007.

Departmental and University Service

University of Georgia

Program Review and Assessment Committee (PRAC)
Faculty Promotion and Tenure Review Committee

School of Public and International Affairs

College Promotion and Tenure Committee

Department of Public Administration and Policy, University of Georgia

Department Head Search Committee, 2013
Faculty Executive Committee, various years
External Funding Committee, various years
3rd Year Review Committee, various years
Faculty Recruiting Committee (Chair), 2009

Pd.D. Admissions Committee, 2009 to present.

Medical University of South Carolina
Faculty Convocation Committee Chair, 2002-2003
Faculty Convocation Committee, 2000-2004
Healthy South Carolina Advisory Board, 2000-2003
MUSC University Research Council, 2001-present
MUSC Planning Committee, CTSA Project, April 2006-present

College of Health Professions, Medical University of South Carolina
College of Health Professions Tenure Committee Chair, 2001-2002
Dean's Council, 2002-present
Chair, Faculty Assembly, 2005-2006
Student Scholarship and Faculty Award Committee Chair, 2002-2005

Department of Health Administration and Policy, Medical University of South Carolina
Faculty Promotion Committee, 2000-2001
Research Committee Chair, 1999-2001
Health Administration and Policy Departmental Hiring Committee, 2001-2002
DHA Leadership Committee, 2001-2002
Director, Health Economics Research Unit, 1999-2002

Center for Health Economic and Policy Studies, Medical University of South Carolina
Founder and Director, 2003-2008

Center for Health Care Research, Medical University of South Carolina
Faculty Search Committee, 1998-1999
Visiting Scholar Program Director, 1998-2001
Executive Committee, 2000-2001

Department of Economics, University of New Hampshire:
Hiring Committee for McKerley Endowed Chair in Health Economics, 1997-1998; Graduate Theory Exam Committee, 1991-1998; Department of Economics Graduate Program Coordinator, 1996-1997; Undergraduate Program Committee, 1991-1993; Graduate Program Committee, 1993; Graduate Program Committee, 1995-1997; Faculty Recruiting Committee, 1991-1992; Faculty Recruiting Committee, 1993; Faculty Recruiting Committee, 1996.

University of New Hampshire:
University Graduate Council, 1993-1995.

Teaching Responsibilities

- Policies for Risky Behaviors, (Undergraduate level, Department of Public Administration and Policy, University of Georgia).
- Public Policy Analysis, (Masters level, Department of Public Administration and Policy, University of Georgia).
- Policy Seminar: Demand Side of Health Economics, (Ph.D. level, Department of Public Administration and Policy, University of Georgia).
- Foundations of Policy Analysis, (Masters level, Department of Public Administration and

Policy, University of Georgia).
- Data Analysis and Statistical Inference, (Ph.D. level, Department of Public Administration and Policy, University of Georgia).
- Advanced Topics in Statistical Modeling, (Ph.D. level, Department of Public Administration and Policy, University of Georgia).
- Program Evaluation, (Masters and Ph.D. level, Department of Public Administration and Policy, University of Georgia).
- Logical Tools for Decision Making, (Doctoral level, Department of Health Administration and Policy, Medical University of South Carolina).
- Health Care Financial Management, (Doctoral level, Department of Health Administration and Policy, Medical University of South Carolina).
- Microeconomic Theory I, (Ph.D. level, Department of Economics, University of New Hampshire).
- Industrial Organization II, (Ph.D. level, Department of Economics, University of New Hampshire).
- Health Economics, (Undergraduate level, Department of Economics, University of New Hampshire; Master's level, Department of Health Management and Policy, University of New Hampshire; Master's Level, Department of Health Administration and Policy, Medical University of South Carolina).
- Intermediate Microeconomic Theory, (Department of Economics, University of New Hampshire).
- Principles of Economics, (Undergraduate level, Department of Economics, University of New Hampshire; Department of Economics, Louisiana State University).

Professional Organizations

- American Economic Association
- American Society of Health Economists
- International Health Economics Association
- Southern Economic Association

Editorial Positions

- Editor-in-Chief, *Health Economics*, 2024 to present.
- Co-Editor, *Health Economics*, 2019-2024.
- Associate Editor, *Health Economics*, (John Wiley and Sons, Publishers), 2006-2019.
- Member of Editorial Board, *Health Economics*, (John Wiley and Sons, Publishers), 1997-present.
- Associate Editor, *Implementation Research and Practice*, 2018-2023.

Awards

- Richard Green Founding Editor Essay Award, 2023 (best paper published in *Archives of Sexual Behavior*)
- Georgescu-Roegen Prize, 2012 (best academic paper published in *Southern Economic Journal*)
- Certificate of Appreciation, Centers for Disease Control and Prevention Effectiveness Fellowship Program, August 2006.
- College of Health Professions Scholar of the Year, Medical University of South Carolina, 2000.

- Whittemore School of Business and Economics Summer Research Grant, University of New Hampshire, 1996.
- Department of Economics 1995-96 Outstanding Scholar, University of New Hampshire.
- University of New Hampshire Summer Faculty Fellowship, Summer 1995.
- University of New Hampshire Summer Faculty Fellowship, Summer 1994.
- Excellence in Teaching Award, College of Business, Louisiana State University, 1990.
- Excellence in Teaching Award, Department of Economics, Louisiana State University, 1989 and 1990.

Personal

- Birth Date: January 27, 1965.
- Citizenship: U.S.A.

References

Guy David, Ph.D.
Department of Health Care Management
202 Colonial Penn Center
3641 Locust Walk
Philadelphia, PA 19104-6218
gdavid2@wharton.upenn.edu

Christopher J. Ruhm, Ph.D.
Frank Batten School of Leadership & Public Policy
University of Virginia
P.O. Box 400893
Charlottesville, VA 22904-4893
ruhm@virginia.edu

Kosali I. Simon, Ph.D.
Herman B Wells Endowed Professor
Indiana University
School of Public and Environmental Affairs (SPEA)
Room 443, 1315 East Tenth Street
Bloomington, IN 47405-1701
simonkos@indiana.edu

Expert Testimony

EXPERT TESTIMONY IN COURT

1) UCB, Inc. and UCP Manufacturing, Inc., Plaintiffs v. Teva Pharmaceuticals USA, Inc., Defendant: Civil Action No. 1:12-CV-4420-CAP. (For the plaintiffs. Contact Attorney: John Kirkland, Fitzpatrick, Cella, Harper & Scinto, New York, NY).

EXPERT TESTIMONY IN DEPOSITIONS

2) United States v. Mark Steven Miller In re: Claim of William R. Davidson: Case No. 3:02CR722; deposition given on 7/29/04. (For the defense. Contact attorney: Betty J. Konen, Assistant U.S. Attorney, U.S. Department of Justice, Cleveland, Ohio.)

3) Lowcountry Orthopaedic, PA, J. David Dalton, M.D., Joel R. Cox, M.D., Michael A Maginnis, M.D., and James J. McCoy, M.D. v. Trident Medical Care Center, LLC and HCA Inc.: Case No. 99-CP-08-2279; deposition given on 8/24/04. (For the defense. Contact attorney: Richard Farrier, Nelson Mullins Riley & Scarborough, Charleston, South Carolina.)

4) Alexis Sams and all others similarly situated vs. Palmetto Health Alliance d/b/a Palmetto Richland and Palmetto Baptist.: Case No. 04-CP-40-4168; and Frances Bonetto and all others similarly situated vs. Palmetto Health Alliance d/b/a Palmetto Richland and Palmetto Baptist.: Case No. 04-CP-40-4362; deposition given on October 20, 2005. (For the defense. Contact attorney: Daniel C. Leonardi, Nexsen Pruet Adams & Kleemeier, LLC, Columbia, South Carolina.)

5) Martha Ward on behalf of herself and others similarly situated vs. Dixie National Life Insurance Company and National Foundation Life Insurance Company: Case No. 03-3-3239-17; deposition given on December 20, 2005. (For the defense. Contact attorney: J. Calhoun Watson, Sowell Gray Stepp & Laffitte, LLC, Columbia, South Carolina.)

6) United States of America ex re. Ven-a-Care of Florida, Inc. v. Dey, Inc. et al.: Civil Action No. 05-11084-PBS; deposition given on May 7-8, 2009. (For the defense. Contact attorney: Sarah L. Reid, Kelley, Drye & Warren, LLP, New York, NY.)

7) The State of Texas ex re. Ven-a-Care of the Florida Keys, Inc. v. Sandoz, Inc. et al.: In the District Court of Texas No. D-1-GV-07-001259; deposition given on August 27-28, 2009. Mylan Pharmaceuticals, Inc. defendant. (For the defense. Contact attorney: Christopher C. Palermo, Kelley, Drye & Warren, LLP, New York, NY.)

8) The State of California ex re. Ven-a-Care of the Florida Keys, Inc. v. Abbott Laboratories et al.: MDL No. 1465; Master File No. 01-12257-PBS. Mylan Pharmaceuticals, Inc. defendant; deposition given September 27, 2009. (For the defense. Contact attorney: Christopher C. Palermo, Kelley, Drye & Warren, LLP, New York, NY.)

9) The State of California ex re. Ven-a-Care of the Florida Keys, Inc. v. Abbott Laboratories et al.: MDL No. 1465; Master File No. 01-12257-PBS. Dey Pharmaceuticals, Inc. defendant; deposition given September 27, 2009. (For the defense. Contact attorney: Sarah L. Reid, Kelley, Drye & Warren, LLP, New York, NY.)

10) State of Alabama v. Mylan Laboratories, Inc. (No. 2005-219.50), State of Alabama v. Mylan Pharmaceuticals, Inc. (No. 2005-219.51), and State of Alabama v. UDL Laboratories, Inc. (No. 2005-219.72); deposition given May 21, 2010. (For the defense. Contact attorney: Christopher C. Palermo, Kelley, Drye & Warren, LLP, New York, NY.)

11) Kathy Green v. Sisters of Charity Providence Hospitals (C/A No. 2004-CP-40-5576), Dubose, et al. v. Tuomey, Inc, d/b/a Tuomey Healthcare System (C/A No. 2004-CP-43-1113), Bisbee v. Kershaw County Medical Center (C/A No. 2004-CP-28-0630); deposition given November 4, 2010. (For the defense. Contact attorney: Daniel C. Leonardi, Nexsen Pruet, LLC, Columbia, SC).

12) In re: Lipitor (Atorvastatin Calcium) Marketing, Sales Practices and Products Liability Litigation: MDL No. 2:14-mn-02502-RMG; deposition given June 11-12, 2015. (For the plaintiffs. Contact Attorney: David F. Miceli, Simmons, Hanly, Conroy LLC, Alton, Illinois 62002).

13) United States ex rel. George v. Fresenius Medical Care Holdings, Inc. No. 2:12-cv-877; deposition given January 14, 2016; deposition given January 13, 2016. (For the defense. Contact attorney: Jamie Rehmann, Esq., Dowd Bennett, LLP, St. Louis, Missouri.)

14) The State of Louisiana ex rel., James D. "Buddy" Caldwell, Attorney General v. Fresenius Medical Care Holdings, Inc., et al.; No. 631586; deposition given January 21, 2016. (for the defendants. Contact Attorney: James F. Bennett, Dowd Bennett, LLP, St. Louis, Missouri.)

15) Commonwealth of Kentucky, ex rel. Andy Beshear, Plaintiff v. Fresenius Medical Care Holdings, Inc. d/b/a Fresenius USA, Inc., Fresenius USA Manufacturing, Inc., Fresenius USA Sales, Inc., Defendants, Civil Action No. 16-CI-00946; deposition given August 23, 2018. (For defendants. Contact attorney: Gabriel Gore, Dowd Bennett, St. Louis, Missouri.)

16) The State of Texas ex rel. Express Med Pharmaceuticals, plaintiffs, v. Lupin Limited, Lupin Inc., Lupin Pharmaceuticals Inc., Robert Hoffman, and Vinita Gupta, defendants, In the District Court of Travis County Texas, 250th Judicial District.; deposition given April 2, 2019. (For the defense. Contact Attorney: John Del Monaco, Esq., Kirkland & Ellis, LLP., New York, NY.)

17) Barbara Lewis, Akemi Buckingham, Bobbie Joe Huling, Cynthia Whetsell, Martha Mearle, Elaina Hufnagel, Theresa Gattuso, Elissa Wagner, and Dixie Williams, Individually and on behalf of all others similarly situated, Plaintiffs v. Rodan + fields, LLS, a California Limited Liability Company, Defendant. Civil Action No. 4:18-cv-02248-PJH; deposition given July 29, 2020. (For the defense. Contact Attorney: Anthony J. Anscombe, Esq., Steptoe and Johnson LLP, Chicago, IL.)

18) Kathleen Jennings, the Attorney General of the State of Delaware, Plaintiff, v. Hugh M. Durden, John S. Lord, Thomas G. Kuntz, John F. Porter III, Geoffrey M. Rogers and Winfred L. Thornton, as Trustees under the Last Will and Testament and Codicils thereto of Alfred I. DuPont, deceased, Defendants and the Nemours Foundation, a not-for-profit corporation organized under the laws of Florida and Ashley Moody, the Attorney General of the State of Florida, Intervenor Defendants. Case No. 16-2017-CA-004945; deposition given April 14, 2021. (For the plaintiff. Contact Attorney: Garrett B. Moritz, Esq., Ross, Aronstam & Moritz, LLP.)

19) Ontario Teachers' Pension Plan Board, Individually and as Lead Plaintiff on behalf of all others similarly situation; and Anchorage Police & Fire Retirement System, Individually and as Named Plaintiff on behalf of all similarly-situated bond purchasers, Plaintiffs, v. Teva Pharmaceutical Industries, LTD; Erez Vigodman; Eyal Desheh; Sigurdur Olafsson; Deborah Griffin; Kare Schultz; Michel McClellan; Yitzhak Peterburg; and Teva Pharmaceutical Finance Netherlands III B.V. Case No. 3:17-cv-00558 (SRU); deposition given July 1, 2021. (For the plaintiff. Contact Attorney: Joseph A. Fonti, Bleichmar Fonti & Auld, LLP.)

20) Joseph Mier, individually and on behalf of all others similarly situated, Plaintiff, vs. CVS Health, Rhode Island corporation; and Does 1 to 100, inclusive, Defendants. Case No. 8:20-cv-01979 DOC (ADSx); deposition given March 23, 2022. (For the defendant. Contact Attorney: Anthony G. Hopp, Steptoe & Johnson, LLP, Chicago, IL.)

21) In RE: United States of America ex rel. Marc Silver, et al. Plaintiffs, v. Omnicare, Inc. et al., Defendants; No. 1:11-cv-01326-NLH-JS; deposition given April 14, 2022. (For the defendant Pharmerica Corp. Contact Attorney: Adrian Snead, Holland & Knight, LLP, Washington, DC.)

22) The State of Texas ex rel. Health Choice Advisory, LLC, Plaintiff, v. Shire PLC; Baxter International Inc.; Baxalta Incorporated; and Viropharma Inc., Defendants. In the District Court 71st Judicial District Harrison County, Texas; Cause No. 20-0415; deposition given August 25, 2022. (For the defense. Contact Attorney: Mike Ciatti, King & Spaulding, Washington, DC).

23) Staley, et al., Plaintiffs, v. Gilead Sciences, Inc., et al., Defendants. In United States District Court for the Northern District of California, San Francisco Division; Case No. 3:19-cv-02573; deposition given September 1, 2022. (For the plaintiff. Contact Attorney: Eric Maurer, Boies, Schiller, & Flexner LLP, Washington DC).

24) United States of America, ex al. ex rel. Matthew A. Fitzer, M.D., Plaintiff-Relator, v. Allergan, Inc. et al., Defendants; Civil Action No. 1:17-cv-00668-SAG; deposition given September 28, 2023. (For the defendant. Contact Attorney: John Bravard, Gibson, Dunn, & Crutcher, LLP, Denver, CO.)

EXPERT TESTIMONY IN REPORTS ONLY

25) Bridget Kennedy, as Administratrix of the estate of Zakiya Kennedy, deceased, vs. Ortho-McNeil Pharmaceutical, Inc., Johnson and Johnson, Columbus & 103rd Street Drug Corp., the Mount Sinai Hospital, and Thain Rousseuau-Pierre, MD: Supreme Court of the State of New York, County of New York, Index No: 106921/05. (For the defense. Contact attorney: Terry Tottenham, Fulbright & Jaworski, LLP, Austin, Texas.)

26) Ronald Drazin et al., vs. Horizon Blue Cross Blue Shield of New Jersey, et al.: Civil Action No. 06-6219. (For the plaintiffs. Contact attorney: Randee M. Matloff, Esq., Nagel Rice, LLP, Roseland, New Jersey.)

27) Commonwealth of Kentucky Ex. Re. Jack Conway, Attorney General v. Alpharma USPD, INC, et al., Commonwealth of Kentucky, Franklin Circuit Court, Div I Civil Action No. 04-CI-1487. (For the defense. Contact attorney: Don Ridings, Covington and Burling, Washington, D.C.)

28) In Re: Actiq Sales and Marketing Practices Litigation: United States District Court for the Eastern District of Pennsylvania; No. 07-ev-4492. (For the defense. Contact Attorney: Erica Smith-Klocek, Morgan, Lewis & Bockius LLP, 1701 Market Street, Philadelphia, PA 19103.)

29) United States ex rel. Michael Ruhe, Kristine Serwitz and Vicente Catala, and Michael Ruje, Individually, and Vicente Catala, Individually and Kristine Serwitz, Individually, Plaintiffs, v. Masimo Corporation, Defendant.; No. CV 10-8169 CBM JCG (For the plaintiffs. Contact Attorney: Sam Collings, Janet, Jenner and Suggs, LLC, 1777 Reisterstown Road, Suite 165, Baltimore, MD 21208.)

LISTED EXPERT BUT WITHOUT REPORT

30) United States of America v. Lori Skowronski Brill, Butch Brill, Rayford Travis Goodwin, Anthony Eric Mosley, James Anthony Goins, Chris Vernon, Jeff Vernon and Leroy Waters: Criminal No. 1:11-cr-00012-KD, USAO No. 11R00039, in the United States District Court for the Southern District of Alabama, Southern Division. (For the defense. Contact attorney: Robert Baugh, Sirote & Permutt, Birmingham, Alabama).

31) State of Louisiana v. GlaxoSmithKline, LLC, formerly SmithKline Beecham Corporation d/b/a GlaxoSmithKline; GlaxoSmithKline, PLC: No. 599353, 19th Judicial District Court for the Parish of East Baton Rouge State of Louisiana. (For the defense. Contact Attorney: Eric Rothschild, Pepper Hamilton LLP, 3000 Two Logan Square, Philadelphia, PA 19103.)

32) Innova Hospital San Antonio, LP and Victory Medical Center Houston, LP, Plaintiffs v. Health care Service Corporation, Blue Cross and Blue Shield of Alabama, Louisiana Health Service & Indemnity Company, et al., C.A. No. 3:12-cv-1607-O. (For the plaintiffs. Contact attorney: Laura O'Hara, Strasburger & Price, LLP, 901 Main Street, Suite 4400, Dallas, TX 75202.)

Appendix B

Materials Considered

Materials Considered[1]

Legal

13 CSR 70-20.060 (Sept. 30, 1996).

13 CSR 70-20.060 (Feb. 28, 2014).

13 CSR 70-20.060 (June 30, 2021).

13 CSR 70-20.070 (Dec. 31, 2002).

13 CSR 70-20.070 (June 30, 2007).

13 CSR 70-20.070 (Feb. 28, 2014).

Declaration of David Hsu in Support of Defendant Gilead Sciences, Inc.'s Notice of Removal. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Oct. 22, 2020).

Declaration of David R. in Support of Gilead Sciences, Inc.'s: (1) Opposition to Plaintiffs' Motion for Class Certification; (2) Motion Under Federal Rule of Evidence 702 to Partially Exclude the Purported Class Certification Expert Testimony of Akhilesh Nagaich; and (3) Motion Under Federal Rule of Evidence 702 to Exclude the Purported Class Certification of Expert Testimony of Jack Fincham. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Sept. 8, 2023).

Defendant Gilead Sciences, Inc.'s Compendium of Exhibits in Support of its: (1) Opposition to Plaintiffs' Motion for Class Certification; (2) Motion Under Federal Rule of Evidence 702 to Partially Exclude the Purported Class Certification Expert Testimony of Akhilesh Nagaich; and (3) Motion Under Federal Rule of Evidence 702 to Exclude the Purported Class Certification of Expert Testimony of Jack Fincham. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Sept. 8, 2023).

Defendant Gilead Sciences, Inc.'s Motion Under Federal Rule of Evidence 702 to Exclude the Purported Class Certification Expert Testimony of Jack Fincham. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Sept. 8, 2023).

Defendant Gilead Sciences, Inc.'s Objections and Response to Plaintiffs' Second Set of Interrogatories. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Aug. 30, 2023).

[1] In preparing my report, I considered the documents listed here along with any items cited or referenced in the body and footnotes of my report.

Defendant Gilead Sciences, Inc.'s Opposition to Plaintiff's Motion for Class Certification. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Sept. 8, 2023).

Memorandum and Order. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Doc. 18) (Sept. 28, 2021).

Memorandum of Law in Support of Defendant Gilead Sciences, Inc.'s Motion Under Federal Rule of Evidence 702 to Exclude the Purported Class Certification Expert Testimony of Jack Fincham. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Sept. 8, 2023).

Plaintiffs' Opposition to Defendant Gilead Sciences, Inc.'s Motion Under Federal Rule of Evidence 702 to Partially Exclude the Purported Class Certification Expert Testimony of Jack Fincham. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Oct. 9, 2023).

Plubell v. Merck & Co., Inc., 289 S.W.3d 707, 715 (Mo. Ct. App. 2009).

Reply in Support of Defendant Gilead Sciences, Inc.'s Motion Under Federal Rule of Evidence 702 to Exclude the Purported Class Certification of Expert Testimony of Jack Fincham. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Nov. 1, 2023).

Third Amended Class Action Complaint. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Mar. 28, 2023).

Victim Impact Statement of Gilead Sciences, Inc., Gilead Sciences Ireland UC, and Gilead Sciences, LLC. *United States of America v. Edvin Ovasapyan, et al.* (N.D. Cal. No. 3:18-cr-533-RS) (Nov. 4, 2024).

Expert Reports

Baker, Laurence C. Expert Report of Laurence C. Baker. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Sept. 8, 2023) and supporting materials.

Fincham, Jack E. Declaration of Jack E. Fincham, Ph.D. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Oct. 9, 2023) and supporting materials.

Fincham, Jack E. Expert Report of Jack E. Fincham, Ph.D. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (June 24, 2023).

Fontein, Saskia. Expert Report of Saskia Fontein. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (June 26, 2023).

Glick, Nancy. Expert Report of Dr. Nancy Glick in Support of Defendant Gilead Sciences, Inc.'s Opposition to Plaintiffs' Motion for Class Certification. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Sept. 7, 2023) and supporting materials.

Harbour, Michael. Expert Report of Michael Harbor, MD, MPH. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (June 26, 2023).

Jarow, Jonathan P. Confidential Expert Report of Jonathan P. Jarow, M.D., in Support of Defendant Gilead Sciences, Inc.'s Opposition to Plaintiffs' Motion for Class Certification. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (Sept. 8, 2023) and supporting materials.

Johnston, Thomas P. Expert Report of Thomas P. Johnston, Ph.D. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (June 26, 2023).

Nagaich, Akhilesh K. Expert Report of Akhilesh K. Nagaich, Ph.D. *Jonathan Searcy and Ervin Kirk v. Gilead Sciences, Inc.* (E.D. Mo. No. 4:20-cv-1523-MTS) (June 26, 2023).

Depositions

Eid, Albert J. Deposition (Aug. 18, 2023).

Robertson, Kelly. Deposition (July 24, 2023).

Zinser, Phillip. Deposition (Aug. 15, 2023).

Relevant Produced Documents

IQVIA Data Files

"CDS.ZXPF.CLIENT.OUTPUT.2001-2005."

"CDS.ZXPF1.TDW.CLIENT.OUTPUT.2006-6-2023."

Pharmacy Data Files

"CONFIDENTIAL_CVS00000002."

"CONFIDENTIAL_CVS00000003."

"CONFIDENTIAL_MedicineShoppe00000003."

"CONFIDENTIAL_Walgreens00000002."

"CONFIDENTIAL_Walgreens00000003."

"CONFIDENTIAL_Walgreens00000004."

"CONFIDENTIAL_Walgreens00000005."

"CONFIDENTIAL_Walgreens00000006."

"CONFIDENTIAL_Walgreens00000007."

"Payload_2023000416.csv."

"Walmart00000002."

"Walmart00000003."

"Walmart00000004."

Miscellaneous

Certificate of Authenticity of Domestic Business Records Pursuant to Federal Rules of Evidence 803(6) and 902(11). *CVS Pharmacy* (Mar. 3, 2023) (CVS00000001).

Certificate of Authenticity of Domestic Business Records Pursuant to Federal Rules of Evidence 803(6) and 902(11). *Medicine Shoppe International, Inc.* (Mar. 9, 2023) (MedicineShoppe00000001).

Certificate of Authenticity of Domestic Business Records Pursuant to Federal Rules of Evidence 803(6) and 902(11). *Walgreen Co.* (June 8, 2023) (Walgreens00000001).

Certificate of Authenticity of Domestic Business Records Pursuant to Federal Rule of Evidence 902(11). *Walmart Inc.* (Apr. 10, 2023) (Walmart00000001).

"U.S. FDA Grants Traditional Approval for Gilead's Once-Daily HIV Medications Truvada and Viread." *Gilead Sciences, Inc.* (Mar. 8, 2006) (GILTDF111602271825).

Data Sources

"Consumer Price Index for All Urban Consumers: All Items in U.S. City Average (CPIAUCSL)." *FRED*. <https://fred.stlouisfed.org/series/CPIAUCSL> (accessed Dec. 10, 2024).

"Drugs@FDA: FDA-Approved Drugs, ANDA 090894." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=090894> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, ANDA 091612." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=091612> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, ANDA 203041." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=203041> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, ANDA 208452." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208452> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 021356." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021356> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 021752." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021752> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 021937." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=021937> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 202123." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=202123> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 203100." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=203100> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 207561." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=207561> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 208215." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208215> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 208351." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208351> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 208464." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=208464> (accessed Dec. 13, 2024).

"Drugs@FDA: FDA-Approved Drugs, NDA 210251." *U.S. Food & Drug Administration*. <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=210251> (accessed Dec. 13, 2024).

"NDC Database Excluded Drugs Database File." *U.S. Food and Drug Administration*. <https://www.fda.gov/drugs/drug-approvals-and-databases/national-drug-code-directory> (accessed Dec. 18, 2024).

"NDC Database File." *U.S. Food and Drug Administration*. <https://www.fda.gov/drugs/drug-approvals-and-databases/national-drug-code-directory> (accessed Dec. 18, 2024).

"Symphony Field Definitions." *Bloomberg, L.P.* (Aug. 2, 2024) (accessed Dec. 6, 2024).

Publications

Financial Documents

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 1999).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2001).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2002).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2003).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2004).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2005).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2006).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2007).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2008).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2009).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2010).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2011).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2012).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2013).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2014).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2015).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2016).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2017).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2018).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2019).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2020).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2021).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2022).

Gilead Sciences, Inc. *Form 10-K* (Dec. 31, 2023).

Other

Al-Omari, Basem, et al. "Conjoint Analysis: A Research Method to Study Patients' Preferences and Personalize Care." *Journal of Personalized Medicine* 12 (2022): 1-14.

Aloy, Blandine, et al. "Is Tenofovir Alafenamide Safer than Tenofovir Disoproxil Fumarate for the Kidneys?" *Aids Reviews* 18.4 (2016): 184-192.

Andreozzi, F., et al. "Clinical Inertia Is the Enemy of Therapeutic Success in the Management of Diabetes and Its Complications: A Narrative Literature Review." *Diabetology & Metabolic Syndrome* 12 (2020): 1-11.

Antela, A., et al. "The Role of Tenofovir Alafenamide in Future HIV Management." *HIV Medicine* 17 (2016): 4-16.

"Antibiotic Resistance Patient Safety Portal." *Centers for Disease Control and Prevention* (Nov. 28, 2023). <https://arpsp.cdc.gov/resources/OAU-Data-Methods-2022.pdf> (accessed Dec. 17, 2024).

"Approval Package for Descovy." *U.S. Food and Drug Administration* (Apr. 4, 2016). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2016/208215Orig1s000Approv.pdf> (accessed Nov. 14, 2024).

"Approval Package for Genvoya." *U.S. Food and Drug Administration* (Nov. 5, 2015). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2015/207561Orig1s000Approv.pdf> (accessed Nov. 14, 2024).

"Approval Package for Odefsey." *U.S. Food and Drug Administration* (Mar. 1, 2016). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2016/208351Orig1s000Approv.pdf> (accessed Dec. 19, 2024).

"Approval Package for Vemlidy." *U.S. Food and Drug Administration* (Nov. 10, 2016). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2016/208464Orig1s000Approv.pdf> (accessed Nov. 14, 2024).

"As Patent Expires, AHF Calls on Gilead for 90% Price Reduction on Tenofovir-Based Drugs, Including Truvada." *AIDS Healthcare Foundation* (Oct. 17, 2017). <https://www.aidshealth.org/2017/10/patent-expires-ahf-calls-gilead-90-price-reduction-tenofovir-based-drugs-including-truvada> (accessed Nov. 25, 2024).

Bedimo, Roger, et al. "Osteoporotic Fracture Risk Associated with Cumulative Exposure to Tenofovir and Other Antiretroviral Agents." *AIDS* 26.7 (2012): 825-831.

Beshearse, Elizabeth M., et al. "Comparison of Outpatient Antibiotic Prescriptions Among Older Adults in IQVIA Xponent and Publicly Available Medicare Part D Data, 2018." *Antimicrobial Stewardship & Healthcare Epidemiology* 3 (2023): 1-4.

Chapman, H., et al. "Purification of PMPA Amidate Prodrugs by SMB Chromatography and X-Ray Crystallography of the Diastereomerically Pure GS-7340." *Nucleosides Nucleotides Nucleic Acids* 20 (2001): 1085-1090.

Conti, Rena M. and Ernst R. Berndt. "Specialty Drug Prices and Utilization After Loss of U.S. Patent Exclusivity, 2001-2007." *Measuring and Modeling Health Care Costs*. Eds. Ana Aizcorbe, Colin Baker, Ernst R. Berndt and David M. Cutler. Chicago: University of Chicago Press for the National Bureau of Economic Research (2018).

"Cost-Effectiveness, the QALY, and the evLYG." *Institute for Clinical and Economic Review*. <https://icer.org/our-approach/methods-process/cost-effectiveness-the-qaly-and-the-evlyg> (accessed Dec. 19, 2024).

"Data Science and Big Data Analytics." *Bates White*. <https://www.bateswhite.com/practices-Data-science-big-data-analytics.html> (accessed Dec. 17, 2024).

De Clercq, Erik. "Tribute to John C. Martin at the Twentieth Anniversary of the Breakthrough of Tenofovir in the Treatment of HIV Infections." *Viruses* 13.12 (2021): 1-12.

Dickson, Sean and Amy Killelea. "Intentionally Delayed Pharmaceutical Innovation Under Perverse Incentives: Gilead's HIV Pipeline as a Case Study." *Health Affairs Forefront* (June 16, 2021). <https://www.healthaffairs.org/content/forefront/intentionally-delayed-pharmaceutical-innovation-under-perverse-incentives-gilead-s-hiv> (accessed Nov. 14, 2024).

"Drug Database: Tenofovir Alafenamide." *Clinicalinfo.hiv.gov* (Apr. 15, 2024). <https://clinicalinfo.hiv.gov/en/drugs/tenofovir-alafenamide/patient> (accessed Nov. 13, 2024).

"Drug Database: Tenofovir Disoproxil Fumarate." *Clinicalinfo.hiv.gov* (Apr. 5, 2024). <https://clinicalinfo.hiv.gov/en/drugs/tenofovir-disoproxil-fumarate/patient> (accessed Nov. 12, 2024).

Eisenberg, Eugene J., Gong-Xin He, and William A. Lee. "Metabolism of GS-7340, a Novel Phenyl Monophosphoramidate Intracellular Prodrug of PMPA, in Blood." *Nucleosides Nucleotides Nucleic Acids* 20 (2001): 1091-98.

Eke, Ahizechukwu C., et al. "Tenofovir Alafenamide Use in Pregnant and Lactating Women Living with HIV." *Expert Opinion on Drug Metabolism & Toxicology* 16.4 (2020): 333-342.

Fein, Adam J. "Building a New Drug Wholesaler Compensation Model: What Happens as Brand Inflation Slows?" *Drug Channels* (July 24, 2018). <https://www.drugchannels.net/2018/07/building-new-drug-wholesaler.html> (accessed Dec. 17, 2024).

Fein, Adam J. "Drug Wholesalers and Brand-Name Drug Prices: Understanding CVS Health/McKesson and Why Pharmacies Lose Money on GLP-1s." *Drug Channels* (Dec. 5, 2023). <https://www.drugchannels.net/2023/12/drug-wholesalers-and-brand-name-drug.html> (accessed Nov. 22, 2024).

"Generic Vemlidy Availability." *Drugs.com* (Nov. 6, 2024). <https://www.drugs.com/availability/generic-vemlidy.html> (accessed Nov. 13, 2024).

"Generic Viread Availability." *Drugs.com* (Nov. 6, 2024). <https://www.drugs.com/availability/generic-viread.html> (accessed Nov. 13, 2024).

"Gilead and Teva Reach Settlement Agreement in Viread® Patent Litigation." *Gilead Sciences, Inc.* (Feb. 19, 2013). <https://www.gilead.com/news/news-details/2013/gilead-and-teva-reach-settlement-agreement-in-viread-patent-litigation> (accessed Nov. 14, 2024).

"Gilead Discontinues Development of GS 9005 and GS 7340; Company Continues Commitment to Research Efforts in HIV." *Gilead Sciences, Inc.* (Oct. 21, 2004). <https://www.gilead.com/news/news-details/2004/gilead-discontinues-development-of-gs-9005-and-gs-7340-company-continues-commitment-to-research-efforts-in-hiv> (accessed Nov. 12, 2024).

"Gilead Initiates Phase 2 Clinical Trial Evaluating GS-7340, A Low-Dose Novel Prodrug of Tenofovir for the Treatment of HIV." *Gilead Sciences, Inc.* (Jan. 24, 2012). <https://www.gilead.com/news/news-details/2012/gilead-initiates-phase-2-clinical-trial-evaluating-gs-7340-a-low-dose-novel-prodrug-of-tenofovir-for-the-treatment-of-hiv> (accessed Nov. 13, 2024).

"Gilead Sciences Announces Fourth Quarter and Full Year 2003 Financial Results." *Gilead Sciences, Inc.* (Jan. 29, 2004). <https://www.gilead.com/news/news-details/2004/gilead-sciences-announces-fourth-quarter-and-full-year-2003-financial-results> (accessed Dec. 19, 2024).

"Gilead's Investigational Antiretroviral Agent Viread™ Reduces Viral Load in HIV Patients with Resistant Virus in Pivotal Phase III Study." *Gilead Sciences, Inc.* (Sept. 25, 2001). <https://www.gilead.com/news/news-details/2001/gileads-investigational-antiretroviral-agent-viread-reduces-viral-load-in-hiv-patients-with-resistant-virus-in-pivotal-phase-iii-study> (accessed Nov. 12, 2024).

Harris, Gardiner. "Document Details Plan to Promote Costly Drug." *The New York Times* (Sept. 1, 2009). <https://www.nytimes.com/2009/09/02/business/02drug.html?_r=2&hp> (accessed Dec. 9, 2024).

Harris, Gardiner. "Prilosec's Maker Switches Users to Nexium, Thwarting Generics." *The Wall Street Journal* (June 6, 2002). <https://globalag.igc.org/health/us/switch.htm> (accessed Dec. 17, 2024).

Highleyman, Liz. "US FDA Approves TAF-Based PrEP for Many People at Risk for HIV." *Aidsmap* (Oct. 7, 2019). <https://www.aidsmap.com/news/oct-2019/us-fda-approves-taf-based-prep-many-people-risk-hiv> (accessed Dec. 10, 2024).

"HIV Diagnoses, Missouri, 2015." *CDC Atlas Plus*. <https://gis.cdc.gov/grasp/nchhstpatlas/charts.html> (accessed Dec. 17, 2024).

"HIV Prevalence, Missouri, 2015." *CDC Atlas Plus*. <https://gis.cdc.gov/grasp/nchhstpatlas/charts.html> (accessed Dec. 17, 2024).

"HIV Treatment Adherence." *HIVinfo.NIH.gov* (Aug. 12, 2021). <https://hivinfo.nih.gov/understanding-hiv/fact-sheets/hiv-treatment-adherence> (accessed Dec. 17, 2024).

"Home." *Clinicalinfo.hiv.gov*. <https://clinicalinfo.hiv.gov/en> (accessed Nov. 13, 2024).

"IQVIA Data-as-a-Service." *Snowflake*. <https://app.snowflake.com/marketplace/listing/GZSOZ5C6AN/iqvia-iqvia-data-as-a-service> (accessed Dec. 19, 2024).

"IQVIA Information Services Published Specifications." *IQVIA* (Jan. 2018).

"IQVIA Named to FORTUNE's 2020 List of 'World's Most Admired Companies.'" *IQVIA* (Jan. 21, 2020). <https://www.iqvia.com/newsroom/2020/01/iqvia-named-to-fortunes-2020-list-of-worlds-most-admired-companies> (accessed Dec. 19, 2024).

Janssen, Aljoscha. "Generic and Branded Pharmaceutical Pricing: Competition Under Switching Costs." *The Economic Journal* 133 (2023): 1937-1967.

Kållberg, Cecilia, et al. "The Effect of Generic Market Entry on Antibiotic Prescriptions in the United States." *Nature Communications* 12.1 (2021): 2937.

Lidgett, Adam. "Gilead Gets $31.8M in Calif. Case Over Counterfeit HIV Drugs." *Law360*. <https://www.law360.com/articles/2266056/print?section=ip> (accessed Nov. 27, 2024).

Mankiw, N. Gregory. *Principles of Microeconomics, Fifth Edition*. Mason, Ohio: South-Western Cengage Learning (2009).

Markowitz, Martin, et al. "Phase I/II Study of the Pharmacokinetics, Safety and Antiretroviral Activity of Tenofovir Alafenamide, a New Prodrug of the HIV Reverse Transcriptase Inhibitor Tenofovir, in HIV-Infected Adults." *Journal of Antimicrobial Chemotherapy* 69 (2014): 1362-69.

Mattingly, Joey. "Understanding Drug Pricing." *US Pharmacist* 37.6 (2012): 40-45.

Pau, Alice K. and Jomy M. George. "Antiretroviral Therapy: Current Drugs." *Infectious Disease Clinics of North America* 28.3 (2014): 371-402.

Peterson, Melody. "A History of Gilead's Biggest HIV Drug." *The Los Angeles Times* (May 29, 2016). <https://www.latimes.com/business/la-fi-gilead-timeline-20160527-snap-story.html> (accessed Nov. 12, 2024).

Prescription Drugs: Spending, Use, and Prices." *Congressional Budget Office* (Jan. 2022). <https://www.cbo.gov/system/files/2022-01/57050-Rx-Spending.pdf> (accessed Dec. 13, 2024).

Prieto, Paula and Daniel Podzamczer. "Switching Strategies in the Recent Era of Antiretroviral Therapy." *Expert Review of Clinical Pharmacology* 12.3 (2019): 235-247.

"Q1 23 Resource Book." *Gilead Sciences, Inc.* (April 2023). <https://s29.q4cdn.com/585078350/files/doc_financials/2023/q1/GILD-Q123-Resource-Book-28-April-2023.pdf> (accessed Dec. 17, 2024).

Quaife, Matthew, et al. "How Well Do Discrete Choice Experiments Predict Health Choices? A Systematic Review and Meta-Analysis of External Validity." *The European Journal of Health Economics* 19 (2018): 1053-1066.

"Quality-Adjusted Life Years (QALYs)." *Springer Nature.* <https://link.springer.com/referenceworkentry/10.1007/978-1-4419-1005-9_613> (accessed Dec. 18, 2024).

Rome, Benjamin, et al. "Factors Associated with Generic Drug Uptake in the United States, 2012 to 2017." Health Policy Analysis 24.6 (2021): 804-811.

Rymer, Jennifer A., et al. "Difference in Medication Adherence Between Patients Prescribed a 30-Day Versus 90-Day Supply After Acute Myocardial Infarction." *Journal of the American Heart Association* 10.1 (2021): 1-9.

Ryon, Lene, et al. "Association Between Antiretroviral Exposure and Renal Impairment Among HIV-Positive Persons With Normal Baseline Renal Function: the D:A:D Study." *The Journal of Infectious Diseases* 207 (2013): 1359-69.

Salazar, David. "Study: Mo. Dispensing Costs Rise to $13 Per Prescription." *Drug Store News* (Oct. 15, 2025). <https://drugstorenews.com/pharmacy/study-mo-dispensing-costs-rise-1-prescription> (accessed Dec. 6, 2024).

Schieber, Lyna Z., et al. "Trends and Patterns of Geographic Variation in Opioid Prescribing Practices by State, United States, 2006-2017." *JAMA Network Open* 2.3 (2019): e190665.

Seeley, Elizabeth. "The Impact of Pharmaceutical Wholesalers on U.S. Drug Spending." *The Commonwealth Fund* (July 20, 2022). <https://www.commonwealthfund.org/publications/issue-briefs/2022/jul/impact-pharmaceutical-wholesalers-drug-spending> (accessed Nov. 22, 2024).

Sheehan, John J., et al. "Real-World Assessment of Treatment Inertia in the Management of Patients Treated for Major Depressive Disorder in the USA." *Journal of Comparative Effectiveness Research* (2023): 1-10.

Shoemaker-Hunt, Sarah, et al. "Cost of Dispensing Study." *Abt Associates* (Jan. 2020). <https://www.nacds.org/pdfs/pharmacy/2020/NACDS-NASP-NCPA-COD-Report-01-31-2020-Final.pdf> (accessed Dec. 6, 2024).

Sood, Neeraj, et al. "The Flow of Money Through the Pharmaceutical Distribution System." *Schaeffer Center White Paper Series* (June 2017). <https://healthpolicy.usc.edu/wp-content/uploads/2017/06/The-Flow-of-Money-Through-the-Pharmaceutical-Distribution-System_Final_Spreadsheet.pdf> (accessed Nov. 22, 2024).

"Special Coverage: 9th Conference on Retroviruses - New Drugs, New Data Hold Promise for Next Decade of HIV Treatment." *Relias Media* (May 1, 2002). <https://www.reliasmedia.com/articles/76107-special-coverage-9th-conference-on-retroviruses-new-drugs-new-data-hold-promise-for-next-decade-of-hiv-treatment> (accessed Nov. 14, 2024).

"Tenofovir Alafenamide." *Drugbank Online* (Aug. 26, 2024). <https://go.drugbank.com/drugs/DB09299> (accessed Nov. 13, 2024).

"Tenofovir Disoproxil." *Drugbank Online* (Nov. 12, 2024). <https://go.drugbank.com/drugs/DB00300> (accessed Nov. 13, 2024).

"Tenofovir Disoproxil Fumarate (Viread)." *International Association of Providers of AIDS Care* (June 2024). <https://www.iapac.org/fact-sheet/tenofovir-disoproxil-fumarate-viread> (accessed Nov. 13, 2024).

"Teva Announces Exclusive Launch of Generic Viread in the United States." *Teva* (Dec. 15, 2017). <https://www.tevapharm.com/news-and-media/latest-news/teva-announces-exclusive-launch-of-generic-viread-in-the-united-states> (accessed Nov. 13, 2024).

"The Cost of Dispensing Study." *Coalition for Community Pharmacy Action* (Aug. 2015). <https://ncpa.org/sites/default/files/pdf/mpi_cod_2015.pdf> (accessed Dec. 6, 2024).

Varian, Hal R. *Intermediate Microeconomics, Eighth Edition*. New York: W. W. Norton & Company (2010) at 118-121.

"Vemlidy (Tenofovir Alafenamide) Tablets Label." *U.S. Food & Drug Administration* (Nov. 2016). <https://www.accessdata.fda.gov/drugsatfda_docs/label/2016/208464s000lbl.pdf> (accessed Dec. 13, 2024).

"Viread Approval Letter." *U.S. Food and Drug Administration* (Oct. 26, 2001). <https://www.accessdata.fda.gov/drugsatfda_docs/nda/2001/21-356_Viread.cfm> (accessed Nov. 12, 2024).

Wassner, Chanie, Nicole Bradley, and Yuman Lee. "A Review and Clinical Understanding of Tenofovir: Tenofovir Disoproxil Fumarate Versus Tenofovir Alafenamide." *Journal of the International Association of Providers of AIDS Care* 19 (2020): 1-10.

"Xponent – Fact Sheet." *IQVIA* (2024).