TECHNICAL APPENDIX

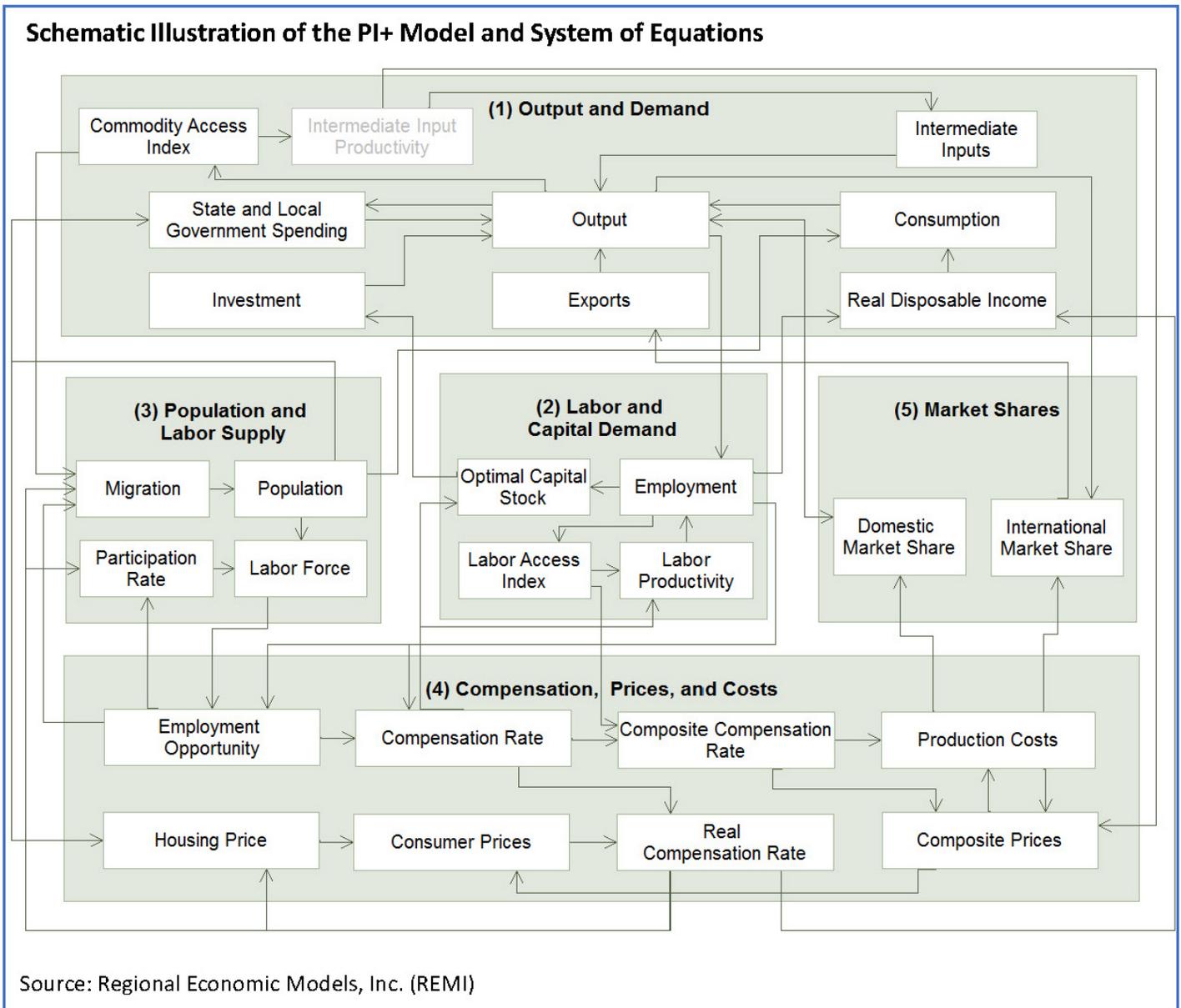### Methods for Economic and Employment Analyses

We used the PI+ (Policy Insight +, version 2.4) system from Regional Economic Models, Inc. (REMI) to translate the economic and employment effects of states' adoption of Medicaid expansions. We incorporate state- and year-specific changes in federal and state funding, as shown in Appendix Table 1. The state-level estimates were then applied as policy changes (or inputs) to the economic baselines in the PI+ model. The model includes year- and state-specific baseline projections for models of employment and other economic parameters for each state and modifies the estimates based on changes in the inputs. PI+ is a dynamic economic modeling system, widely used by state and federal agencies, universities, and other analysts to estimate the employment and economic impact of policy changes.[1] The REMI PI+ system assumes a complex system of relationships in the national and state economies.[2] We and other researchers have used earlier versions of the REMI model in other health policy analyses.[3]

PI+ uses econometric models to estimate the effects of changes, in our case, implemented as changes in the demand for health care services as a result of the American Rescue Plan policies and Medicaid expansion. We used REMI's March 2021 forecast update,[4] which includes data from the U.S. Economic Outlook for 2020–2022 of the University of Michigan's Research Seminar in Quantitative Economics (Feb. 2021) and the Congressional Budget Office's (CBO) Budget and Economic Outlook for 2021 to 2031 (Feb. 2021). The system computes baseline employment and economic forecasts and then alternative forecasts based on the inputs introduced. The differences between the baseline and the alternatives are the estimated changes in employment and state economies.

We assume the baseline includes all current policies except for the Medicaid expansions described, including the expiration of the 6.2-percentage-point increase in Medicaid federal matching rates during the Public Health Emergency, as contained in the Families First Coronavirus Response Act, and the phase-down of the enrollment maintenance of effort required by that law. In January, the U.S. Department of Health and Human Services announced the Public Health Emergency will be maintained this calendar year; we assume it expires in January 2022. While this change will affect state Medicaid caseloads and expenditures, the additional federal and state funding that will occur if Medicaid eligibility is expanded are essentially independent of those changes.

Our estimates are based on the inflow of Medicaid expenditures for eligibility expansions (and offsetting reductions in federal Premium Tax Credits) into the health care sector in each state, including both the regular health sector (e.g., hospitals, clinics and doctors' offices) and into the retail health sector (mostly pharmacies). Estimates of inputs for health care spending include both the federal and smaller state share of funding. This effectively models the net inflow of federal dollars because of Medicaid expansion as an exogenous input to the state economy. In addition, the small state share is modeled as a shift from general state government spending to health care.

Since this analysis is driven by the increase in federal funding that would occur if states expanded their Medicaid programs, we can view the increases as exogenous to other state economic activity. Our estimates account for the fact that the state could spend its modest share of Medicaid expansion costs on some other purpose if it does not expand. However, the much larger federal share of expenditures simply would not flow to the state economy, and thus we do not need to account for how it would be used if expansion does not occur.

Schematic Illustration of the PI+ Model and System of Equations

(1) Output and Demand

Commodity Access Index → Intermediate Input Productivity → Intermediate Inputs

State and Local Government Spending — Output — Consumption

Investment — Exports — Real Disposable Income

(3) Population and Labor Supply

Migration → Population

Participation Rate → Labor Force

(2) Labor and Capital Demand

Optimal Capital Stock ← Employment

Labor Access Index → Labor Productivity

(5) Market Shares

Domestic Market Share — International Market Share

(4) Compensation, Prices, and Costs

Employment Opportunity → Compensation Rate → Composite Compensation Rate → Production Costs

Housing Price → Consumer Prices → Real Compensation Rate → Composite Prices

Source: Regional Economic Models, Inc. (REMI)

APPENDIX TABLE 1
Estimated State Budget Effects if States Expanded Medicaid in January 2022 and 2022–2025

State	Calendar Years	ARP federal bonus payment gained	Federal match gained for expansions (adults & children)	Reduction in federal premum tax credits	Net federal revenue growth	State share of Medicaid expansion costs	Estimated state & local tax revenue gained
		($ millions)	($ millions)	($ millions)	($ millions)	($ millions)	($ millions)
Alabama	2022	$346	$1,880	-$171	$2,055	$213	$50
	2023	$374	$1,983	-$171	$2,186	$225	$59
	2024	$0	$2,094	-$171	$1,923	$238	$55
	2025	$0	$2,204	-$171	$2,033	$250	$57
	2022–2025	**$720**	**$8,161**	**-$684**	**$8,198**	**$926**	**$221**
Florida	2022	$1,444	$5,864	-$665	$6,642	$681	$250
	2023	$1,558	$6,186	-$665	$7,078	$720	$295
	2024	$0	$6,531	-$665	$5,865	$760	$263
	2025	$0	$6,876	-$665	$6,211	$801	$271
	2022–2025	**$3,001**	**$25,456**	**-$2,662**	**$25,796**	**$2,962**	**$1,079**
Georgia	2022	$609	$3,261	-$278	$3,592	$374	$110
	2023	$658	$3,440	-$278	$3,819	$396	$131
	2024	$0	$3,632	-$278	$3,354	$418	$121
	2025	$0	$3,824	-$278	$3,546	$440	$125
	2022–2025	**$1,267**	**$14,158**	**-$1,114**	**$14,311**	**$1,628**	**$488**
Kansas	2022	$229	$1,172	-$39	$1,362	$149	$49
	2023	$247	$1,236	-$39	$1,444	$158	$59
	2024	$0	$1,305	-$39	$1,266	$167	$56
	2025	$0	$1,374	-$39	$1,335	$176	$58
	2022–2025	**$475**	**$5,088**	**-$155**	**$5,408**	**$649**	**$223**
Mississippi	2022	$299	$1,783	-$70	$2,012	$207	$44
	2023	$323	$1,880	-$70	$2,133	$220	$52
	2024	$0	$1,985	-$70	$1,915	$232	$49
	2025	$0	$2,090	-$70	$2,021	$244	$51
	2022–2025	**$622**	**$7,739**	**-$279**	**$8,081**	**$903**	**$196**
Missouri	2022	$656	$2,899	-$151	$3,405	$369	$86
	2023	$708	$3,056	-$151	$3,613	$392	$102
	2024	$0	$3,227	-$151	$3,076	$414	$92
	2025	$0	$3,398	-$151	$3,247	$436	$95
	2022–2025	**$1,364**	**$12,581**	**-$603**	**$13,342**	**$1,611**	**$375**
North Carolina	2022	$828	$5,547	-$411	$5,964	$628	$141
	2023	$893	$5,853	-$411	$6,335	$664	$168
	2024	$0	$6,179	-$411	$5,768	$701	$161
	2025	$0	$6,505	-$411	$6,094	$738	$168
	2022–2025	**$1,722**	**$24,084**	**-$1,645**	**$24,161**	**$2,732**	**$638**

APPENDIX TABLE 1 (CONTINUED)

Estimated State Budget Effects if States Expanded Medicaid in January 2022 and 2022–2025

		ARP federal bonus payment gained	Federal match gained for expansions (adults & children)	Reduction in federal premum tax credits	Net federal revenue growth	State share of Medicaid expansion costs	Estimated state & local tax revenue gained
Oklahoma	2022	$287	$2,250	-$139	$2,398	$353	$54
	2023	$310	$2,366	-$139	$2,537	$380	$64
	2024	$0	$2,499	-$139	$2,360	$401	$62
	2025	$0	$2,632	-$139	$2,493	$423	$65
	2022–2025	**$597**	**$9,747**	**-$557**	**$9,788**	**$1,557**	**$245**
South Carolina	2022	$336	$2,145	-$266	$2,215	$245	$57
	2023	$363	$2,263	-$266	$2,360	$260	$68
	2024	$0	$2,389	-$266	$2,123	$274	$65
	2025	$0	$2,515	-$266	$2,249	$289	$68
	2022–2025	**$699**	**$9,312**	**-$1,063**	**$8,948**	**$1,068**	**$258**
South Dakota	2022	$49	$368	-$33	$384	$45	$9
	2023	$52	$389	-$33	$408	$48	$10
	2024	$0	$410	-$33	$378	$51	$9
	2025	$0	$432	-$33	$399	$53	$10
	2022–2025	**$101**	**$1,599**	**-$131**	**$1,570**	**$197**	**$37**
Tennessee	2022	$628	$1,813	-$284	$2,157	$210	$70
	2023	$677	$1,913	-$284	$2,306	$222	$82
	2024	$0	$2,019	-$284	$1,735	$234	$70
	2025	$0	$2,126	-$284	$1,842	$247	$71
	2022–2025	**$1,305**	**$7,872**	**-$1,137**	**$8,040**	**$913**	**$293**
Texas	2022	$2,217	$13,657	-$493	$15,381	$1,695	$509
	2023	$2,392	$14,402	-$493	$16,301	$1,798	$624
	2024	$0	$15,206	-$493	$14,712	$1,899	$601
	2025	$0	$16,009	-$493	$15,516	$2,000	$621
	2022–2025	**$4,610**	**$59,273**	**-$1,973**	**$61,910**	**$7,392**	**$2,355**
Wisconsin	2022	$526	$931	-$152	$1,305	-$234	$46
	2023	$567	$1,000	-$152	$1,415	-$264	$53
	2024	$0	$1,055	-$152	$904	-$279	$40
	2025	$0	$1,111	-$152	$959	-$293	$39
	2022–2025	**$1,093**	**$4,097**	**-$607**	**$4,583**	**-$1,070**	**$178**
Wyoming	2022	$31	$272	-$29	$274	$49	$4
	2023	$34	$286	-$29	$291	$53	$4
	2024	$0	$302	-$29	$273	$56	$4
	2025	$0	$318	-$29	$289	$59	$4
	2022–2025	**$65**	**$1,179**	**-$117**	**$1,127**	**$217**	**$16**
All 14 states	2022	$8,486	$43,841	-$3,182	$49,146	$4,985	$1,480
	2023	$9,155	$46,253	-$3,182	$52,227	$5,271	$1,772
	2024	$0	$48,835	-$3,182	$45,653	$5,567	$1,649
	2025	$0	$51,417	-$3,182	$48,235	$5,862	$1,702
	2022–2025	**$17,641**	**$190,346**	**-$12,726**	**$195,261**	**$21,685**	**$6,603**

Data: Authors' analysis based on REMI PI+ dynamic economic model; and estimates by the Urban Institute Health Policy Simulation Model.

Notes to Appendix Table 1

1. The American Rescue Plan's Federal Bonus Payments are estimated by computing 5 percent of state Medicaid benefit expenditures based on state estimates of FY 2022 Medicaid benefit expenditures, as reported in Form CMS-37, submitted by states to the Centers for Medicare and Medicaid Services in February 2021. These are the states' projections of regular Medicaid expenditures without assumptions of program expansions (and submitted before the American Rescue Plan was enacted). We updated these levels to 2023 through 2025, using inflation factors from the March 2020 CBO Medicaid baseline. We subtracted Medicaid Disproportionate Share Hospital payments, which are not included in the bonus, based on allotments reported by the Medicaid and CHIP Payment and Access Commission (MACPAC), Mar. 2021, and increased in line with the CBO baseline.

2. Federal Match Gained for Expansions (Adults & Children) is based on Urban Institute estimates of the number of additional adults who would be enrolled in Medicaid if these states expanded, increased by 5 percent to account for Medicaid enrollment growth postpandemic. (See Michael Simpson, *The Implications of Medicaid Expansion in the Remaining States: 2020 Update,* Urban Institute, June 2020; and Matthew Buettgens, *Medicaid Expansion Would Have a Larger Impact Than Ever During the COVID-19 Pandemic,* Urban Institute, Jan. 2021.) We computed the others (e.g., children) who are already eligible who enroll after expansion ("woodwork effect"). State Medicaid expenditures per enrollee were based on MACPAC analyses (Dec. 2020) of Medicaid expenditures per enrollee by state and eligibility category in 2018, increased to 2022–25 levels based on the CBO Medicaid baseline. Federal matching payments for newly eligible adults were computed using 90 percent of the expenditure per enrollee times the number of newly eligible enrollees. Each state's regular Federal Medical Assistance Percentage (FMAP) was used to compute federal matching payments for currently eligible new enrollees. We conservatively assume the 6.2 percent FMAP increase under the Families First Coronavirus Response Act will expire in January 2022, meaning that states will be responsible their full regular FMAP for nonexpansion enrollees.

3. The Reduction in Federal Premium Tax Credits accounts for health insurance marketplace members who shift from the marketplace into Medicaid after Medicaid expands. The number shifting is based on estimates of the number of newly covered people with incomes between 100 percent and 138 percent of poverty in each state; those with incomes below poverty are not eligible for Premium Tax Credits. The value of the Premium Tax Credits is based on the value of benchmark Silver Plans at the higher of 2020 or 2021 levels.

4. Net Federal Revenue Gained is the sum of numbers 1, 2, and 3 above.

5. The State Medicaid Expansion Costs are based on 10 percent of estimated Medicaid expenditures for newly eligible adults in each state, plus the regular state matching share of Medicaid expenditures for others who enroll but were already eligible.

6. Estimated State and Local Tax Revenue Gained is based on estimates of the State Gross Product Gained (see Appendix Table 3) for each state and year and multiplied by the estimated State and Local Effective Tax Rate. The tax rate is computed based on state and local general fund revenue tax collections (from the Census of Governments for 2018) divided by the State Gross Domestic Product for 2018 (from the U.S. Bureau of Economic Analysis).

APPENDIX TABLE 2

Detailed Estimates of Employment Increases if States Expand Medicaid in January 2022

State	Total state employment (thousands)				Health care employment (thousands)			
	2022	2023	2024	2025	2022	2023	2024	2025
Alabama	28.45	28.88	24.80	25.02	14.20	14.40	12.40	12.69
Florida	134.75	131.28	106.93	108.31	61.57	61.80	50.45	51.63
Georgia	64.28	65.09	56.08	56.30	28.84	29.18	25.07	25.58
Kansas	22.89	23.74	20.80	21.02	11.88	12.05	10.40	10.61
Mississippi	21.73	22.41	19.68	19.98	12.45	12.65	11.09	11.33
Missouri	50.06	50.78	42.54	42.66	26.60	26.87	22.53	22.98
North Carolina	83.02	86.16	77.24	77.98	43.21	43.94	39.01	39.82
Oklahoma	31.69	32.72	29.82	30.22	17.83	18.10	16.46	16.81
South Carolina	30.65	31.51	27.96	28.33	14.80	15.05	13.25	13.56
South Dakota	4.22	4.21	3.73	3.76	2.24	2.26	2.03	2.07
Tennessee	43.24	43.93	34.70	34.27	18.30	18.53	14.54	14.85
Texas	298.95	311.38	279.85	280.59	143.50	145.49	128.67	131.11
Wisconsin	21.05	20.34	13.20	12.86	7.67	7.70	4.35	4.48
Wyoming	1.91	1.79	1.53	1.53	1.31	1.32	1.21	1.24
Subtotal, 14 states	**836.88**	**854.20**	**738.86**	**742.82**	**404.39**	**409.33**	**351.44**	**358.75**
All other states	209.12	125.60	68.17	53.62	59.88	52.03	41.68	41.74
Total, U.S.	**1,046.00**	**979.80**	**807.03**	**796.44**	**464.27**	**461.36**	**393.11**	**400.50**

State	Construction employment (thousands)				Retail employment (thousands)			
	2022	2023	2024	2025	2022	2023	2024	2025
Alabama	2.09	2.52	2.28	2.10	3.16	2.97	2.52	2.57
Florida	10.56	11.65	9.69	8.66	13.28	11.79	9.40	9.65
Georgia	4.94	6.00	5.45	4.95	6.51	6.13	5.21	5.26
Kansas	1.57	1.98	1.86	1.73	2.39	2.33	2.02	2.05
Mississippi	1.40	1.75	1.64	1.54	2.58	2.49	2.17	2.22
Missouri	3.67	4.47	4.00	3.62	5.23	4.95	4.07	4.11
North Carolina	6.57	8.33	7.97	7.45	9.11	8.85	7.82	7.91
Oklahoma	2.12	2.57	2.43	2.27	3.47	3.37	3.05	3.10
South Carolina	2.33	2.86	2.67	2.49	3.52	3.38	2.97	3.02
South Dakota	0.35	0.42	0.39	0.36	0.53	0.49	0.43	0.44
Tennessee	3.82	4.68	3.97	3.41	4.81	4.55	3.49	3.48
Texas	25.11	31.20	29.40	27.01	28.34	27.78	24.67	24.75
Wisconsin	1.53	1.69	1.16	0.88	2.02	1.76	0.98	0.98
Wyoming	0.13	0.12	0.09	0.08	0.22	0.19	0.17	0.17
Subtotal, 14 states	**66.18**	**80.24**	**72.99**	**66.55**	**85.18**	**81.03**	**68.98**	**69.71**
All other states	14.38	3.68	–5.67	–10.11	15.14	3.57	–0.75	–1.59
Total, U.S.	**80.56**	**83.91**	**67.31**	**56.44**	**100.31**	**84.60**	**68.24**	**68.11**

APPENDIX TABLE 2 (CONTINUED)

Detailed Estimates of Employment Increases if States Expand Medicaid in January 2022

State	Finance & insurance employment (thousands)				All other employment (thousands)			
	2022	2023	2024	2025	2022	2023	2024	2025
Alabama	0.76	0.67	0.53	0.52	8.24	8.32	7.07	7.15
Florida	5.27	4.43	3.37	3.35	44.07	41.61	34.03	35.02
Georgia	2.04	1.80	1.44	1.41	21.94	21.97	18.92	19.10
Kansas	0.73	0.65	0.52	0.51	6.31	6.73	6.00	6.12
Mississippi	0.40	0.35	0.28	0.27	4.91	5.18	4.50	4.61
Missouri	1.39	1.21	0.93	0.90	13.17	13.29	11.01	11.06
North Carolina	1.92	1.69	1.36	1.31	22.20	23.35	21.09	21.50
Oklahoma	0.85	0.77	0.64	0.63	7.43	7.92	7.25	7.41
South Carolina	0.75	0.66	0.53	0.51	9.25	9.55	8.54	8.74
South Dakota	0.20	0.17	0.13	0.13	0.90	0.88	0.75	0.76
Tennessee	1.27	1.11	0.85	0.83	15.05	15.05	11.86	11.70
Texas	10.89	10.06	8.40	8.14	91.11	96.85	88.71	89.58
Wisconsin	0.82	0.67	0.49	0.48	9.01	8.52	6.22	6.04
Wyoming	0.07	0.05	0.04	0.04	0.19	0.10	0.02	0.01
Subtotal, 14 states	**27.35**	**24.28**	**19.50**	**19.02**	**253.79**	**259.33**	**225.95**	**228.79**
All other states	19.64	14.58	11.29	11.31	100.09	51.75	21.63	12.27
Total, U.S.	**46.98**	**38.85**	**30.78**	**30.33**	**353.88**	**311.08**	**247.58**	**241.06**

Data: Authors' analysis based on REMI PI+ dynamic economic model.

APPENDIX TABLE 3

Detailed Estimates of State Economic Effects if States Expand Medicaid in January 2022

State	Output ($ billions)				
	2022	2023	2024	2025	2022–2025
Alabama	$4.54	$5.35	$4.89	$5.02	$19.81
Florida	$20.72	$24.34	$21.60	$22.21	$88.86
Georgia	$10.91	$12.89	$11.92	$12.25	$47.98
Kansas	$3.80	$4.56	$4.27	$4.40	$17.03
Mississippi	$3.13	$3.70	$3.44	$3.56	$13.83
Missouri	$7.76	$9.13	$8.22	$8.41	$33.53
North Carolina	$13.05	$15.57	$14.80	$15.31	$58.73
Oklahoma	$4.81	$5.78	$5.58	$5.79	$21.96
South Carolina	$4.86	$5.83	$5.51	$5.70	$21.90
South Dakota	$0.80	$0.92	$0.86	$0.89	$3.47
Tennessee	$7.98	$9.35	$8.02	$8.08	$33.42
Texas	$48.75	$59.69	$57.34	$58.80	$224.58
Wisconsin	$3.78	$4.33	$3.26	$3.17	$14.54
Wyoming	$0.35	$0.41	$0.37	$0.37	$1.50
Subtotal, 14 states	**$135.25**	**$161.83**	**$150.09**	**$153.96**	**$601.13**
All other states	$50.13	$46.86	$34.63	$31.27	$162.89
Total, U.S.	**$185.38**	**$208.70**	**$184.71**	**$185.23**	**$764.02**

State	State gross product ($ billions)				
	2022	2023	2024	2025	2022–2025
Alabama	$2.59	$3.05	$2.81	$2.90	$11.35
Florida	$12.32	$14.53	$12.95	$13.37	$53.16
Georgia	$6.34	$7.51	$6.98	$7.21	$28.04
Kansas	$2.19	$2.63	$2.47	$2.56	$9.85
Mississippi	$1.80	$2.13	$1.99	$2.07	$7.99
Missouri	$4.53	$5.33	$4.82	$4.96	$19.65
North Carolina	$7.54	$9.00	$8.61	$8.96	$34.12
Oklahoma	$2.82	$3.38	$3.28	$3.42	$12.90
South Carolina	$2.79	$3.35	$3.19	$3.32	$12.65
South Dakota	$0.47	$0.54	$0.51	$0.53	$2.03
Tennessee	$4.59	$5.38	$4.63	$4.70	$19.29
Texas	$28.13	$34.45	$33.23	$34.29	$130.10
Wisconsin	$2.14	$2.45	$1.84	$1.81	$8.24
Wyoming	$0.21	$0.24	$0.22	$0.22	$0.88
Subtotal, 14 states	**$78.44**	**$93.96**	**$87.50**	**$90.32**	**$350.22**
All other states	$27.56	$25.91	$19.23	$17.43	$90.13
Total, U.S.	**$106.00**	**$119.87**	**$106.73**	**$107.74**	**$440.35**

APPENDIX TABLE 3 (CONTINUED)

Detailed Estimates of State Economic Effects if States Expand Medicaid in January 2022

State	Personal income ($ billions)				
	2022	2023	2024	2025	2022–2025
Alabama	$1.56	$1.75	$1.65	$1.76	$6.72
Florida	$7.62	$8.30	$7.51	$8.06	$31.49
Georgia	$3.83	$4.29	$4.05	$4.31	$16.48
Kansas	$1.39	$1.62	$1.57	$1.69	$6.27
Mississippi	$1.06	$1.21	$1.16	$1.26	$4.70
Missouri	$2.72	$3.04	$2.82	$3.00	$11.57
North Carolina	$4.67	$5.35	$5.26	$5.65	$20.94
Oklahoma	$1.81	$2.06	$2.05	$2.21	$8.12
South Carolina	$1.71	$1.95	$1.90	$2.04	$7.60
South Dakota	$0.25	$0.28	$0.27	$0.29	$1.09
Tennessee	$2.93	$3.25	$2.81	$2.93	$11.93
Texas	$18.97	$22.01	$21.77	$23.23	$85.97
Wisconsin	$1.26	$1.35	$1.01	$1.05	$4.68
Wyoming	$0.09	$0.09	$0.09	$0.10	$0.37
Subtotal, 14 states	**$49.89**	**$56.54**	**$53.91**	**$57.57**	**$217.91**
All other states	$12.96	$7.26	$3.01	$1.56	$24.79
Total, U.S.	**$62.84**	**$63.80**	**$56.93**	**$59.13**	**$242.70**

Data: Authors' analysis based on REMI PI+ dynamic economic model.

Notes

1. Regional Economic Models, Inc. (REMI), "PI+," n.d.

2. Regional Economic Models, Inc. (REMI), "Model Equations," 2020.

3. For example, Leighton Ku et al., *Repealing Federal Health Reform: The Economic and Employment Consequences for States* (Commonwealth Fund, Jan. 2017); Leighton Ku et al., *The American Health Care Act: Economic and Employment Consequences for States* (Commonwealth Fund, June 2017); and John Z. Ayanian et al., "Economic Effects of Medicaid Expansion in Michigan," *New England Journal of Medicine* 376, no. 5 (Feb. 2, 2017): 407–10.

4. Regional Economic Models, Inc. (REMI), "Model Updates," Mar. 2021 update.