Macroeconomic Feedback Effects of Medicaid Expansion: Evidence from Michigan

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Abstract

Context: Medicaid expansion has costs and benefits for states. The net impact on a state's budget is a central concern for policy makers debating implementing this provision of the Affordable Care Act. How large is the state-level fiscal impact of expanding Medicaid, and how should it be estimated?

Methods: We use Michigan as a case study for evaluating the state-level fiscal impact of Medicaid expansion, with particular attention to the importance of macroeconomic feedback effects relative to the more straightforward fiscal effects typically estimated by state budget agencies. We combine projections from the state of Michigan's House Fiscal Agency with estimates from a proprietary macroeconomic model to project the state fiscal impact of Michigan's Medicaid expansion through 2021.

Findings: We find that Medicaid expansion in Michigan yields clear fiscal benefits for the state, in the form of savings on other non-Medicaid health programs and increases in revenue from provider taxes and broad-based sales and income taxes through at least 2021. These benefits exceed the state's costs in every year.

Conclusions: While these results are specific to Michigan's budget and economy, our methods could in principle be applied in any state where policy makers seek rigorous evidence on the fiscal impact of Medicaid expansion.

Keywords Medicaid, Affordable Care Act, state-level policy evaluation, macroeconomic forecasting

One of the main pillars of the Affordable Care Act (ACA) is the expansion of Medicaid eligibility to all individuals with incomes up to 138% of the federal poverty level. Although the new income eligibility threshold was meant to apply nationwide, in 2012 the Supreme Court ruled that states

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could not be forced to implement the policy, effectively making the expansion optional for states. As of late 2018, 36 states and the District of Columbia have opted to implement the Medicaid expansion. While many states' initial decisions about Medicaid expansion in the wake of the Supreme Court's 2012 decision were largely dictated by partisan politics, over time other concerns have come to bear, including state budgetary pressures (Jacobs and Callaghan 2013; Jones, Singer, and Ayanian 2014; Rose 2015). Because the expansion was initially free for states—that is, funded entirely by the federal government from 2014 through 2016—some have argued that failing to expand means foregoing not only coverage for low-income adults but also clear fiscal and economic benefits for all state residents. (Council of Economic Advisers 2009; Council of Economic Advisers 2014; Assistant Secretary for Planning and Evaluation 2015). Beginning in 2017, each expansion state was required to pay 5% of the cost of its own expansion; this share will gradually increase to 10% in 2020 and subsequent years.

Faced with the prospect of this new budget expense, states that have already expanded coverage may take a hard look at the impact of Medicaid expansion on the state's budget. States that have not yet expanded but are debating doing so must decide whether the benefits of expansion exceed the costs for their state. Objective information on costs and benefits is particularly important as states have increasingly turned to ballot initiatives on Medicaid expansion. In November 2018 voters in Idaho, Nebraska, and Utah approved referenda to expand Medicaid in their state, following the example of Maine voters in 2017 (Goodnough 2018a). Policy makers and voters in the 14 states that have not yet expanded Medicaid deserve objective information that will help inform their decisions.

A growing body of research documents the benefits of expanding Medicaid for new enrollees, including improvements in access to care, better self-reported physical and mental health, increased financial security, and reduced out-of-pocket medical spending (Baicker et al. 2014; Blavin et al. 2018; Finkelstein et al. 2012; Hu et al. 2018; Shartzer, Long, and Anderson 2015; Simon, Soni, and Cawley 2017; Sommers et al. 2015; Wherry and Miller 2016). The net impact of Medicaid expansion on a state's budget, however, remains unclear. On one hand, states must cover a share of program expenditures: between 5 and 10% of the total, depending on the year. On the other hand, states realize fiscal benefits from expansion. Some of these benefits are relatively predictable; for example, expansion shifts responsibility for some existing health care spending from the state to the federal government. Other fiscal benefits are harder to quantify. The infusion of

federal funds as a result of Medicaid expansion will increase economic activity in the state, and some fraction of this new activity will return to the state's coffers as increased tax revenue, but how much (Chernew 2016)? Estimating the macroeconomic feedback effects of expansion is a particularly thorny task. This uncertainty has led some to warn that the economic benefits of Medicaid expansion to states have been overstated (Haislmaier and Gonshorowski 2012). Indeed, in Maine, the governor has refused to implement the Medicaid expansion approved by voters on the grounds that it would cost the state too much (Goodnough 2018b).

How large are the state-level budgetary impacts of expanding Medicaid, and how should they be estimated? In this article, we use Michigan as a case study for evaluating the state-level fiscal impact of Medicaid expansion, with particular attention to the importance of macroeconomic feedback effects relative to the more straightforward fiscal effects typically estimated by state budget agencies. Michigan implemented the ACA Medicaid expansion by establishing the Healthy Michigan Plan (HMP) in April 2014 (Ayanian 2013; Ayanian, Clark, and Tipirneni 2014; Ayanian et al. 2017; Mayer et al. 2018). As of December 2018 the plan covered more than 670,000 low-income Michigan residents—over 10% of Michigan's population aged 18 to 64. The question of economic impact is particularly salient in Michigan because the enabling legislation for the HMP, narrowly passed by the state legislature in 2013, requires the program to terminate if the state's share of the cost exceeds the program's savings to state and local governments.

We combined projections from the state of Michigan's House Fiscal Agency with estimates from a proprietary macroeconomic model to project the state fiscal impact of Michigan's Medicaid expansion through 2021. In the first five years of the expansion, the state's savings on other programs are more than enough to cover the cost of the state's share of the Medicaid expansion. Over time, the state's share of the cost increases, and beginning in 2019 savings alone are no longer enough to cover the state's share. However, taking into account increased revenue from health care provider taxes yields just enough to cover the state's share of expansion costs. Our analysis finds that macroeconomic feedback effects generate an additional $140 million in state tax revenue each year. Medicaid expansion is also estimated to increase the state's population by over 30,000 residents by fiscal year 2021. Depending on the extent to which the new residents increase the state's cost of providing other services, the increase in population could offset up to three-quarters of that macroeconomic feedback benefit by that time, although the actual increase in those costs could be

substantially lower. Overall, in the case of Michigan, the data are clear that Medicaid expansion is indeed a good deal for the state's budget; moreover, analyses that omit feedback effects overlook a significant fiscal benefit to the state.

Our analysis is specific to Michigan's experience; but the general approach could be applied to any state that has expanded Medicaid under the ACA or is considering doing so. Our hope is that laying out the inner workings of the analysis will help increase researchers' and policy makers' understanding of these models so that they can help guide future decisions about Medicaid expansion and other public policy choices. The article proceeds as follows. We begin with background on Medicaid and the ACA's expansion of Medicaid. Next, we provide an overview of models to estimate the economic impact of Medicaid expansion, focusing on whether or not these models incorporate macroeconomic feedback. The third section presents further detail on how such an economic analysis is implemented, using Michigan's Medicaid expansion as a case study. The fourth section presents sensitivity analyses in which key model inputs are varied in order to gauge the importance of different underlying assumptions in driving the results. The fifth section discusses limitations, and the seventh concludes.

Background on the ACA and Medicaid Expansion

The Medicaid program is run by the states and financed jointly by states and the federal government. The federal government's share of the cost (formally known as the Federal Matching Assistance Percentage, or FMAP) varies across different groups of beneficiaries. The federal share for each state's traditional Medicaid beneficiaries—that is, low-income children and their parents, as well as seniors in nursing homes, who were eligible prior to the ACA—is determined annually as a function of the state's per-capita income. Overall, the federal share of Medicaid spending before the ACA was about 57%; in 2010, state-specific federal shares ranged from 50% in relatively high-income states such as New Jersey, California, Massachusetts, and Connecticut to 76% in Mississippi (Assistant Secretary for Planning and Evaluation n.d.-b).

As of 2010, states were required to provide Medicaid for certain populations, such as children ages 6 to 18 in families with incomes up to 100% of the federal poverty level (FPL), but they had some flexibility about eligibility for other populations, such as low-income adults without children (Rudowitz, Artiga, and Arguello 2014). Coverage for parents was limited

in most states to those with incomes well below the poverty level, and very few states at that time offered any Medicaid coverage for adults without dependent children (KFF n.d.-b). In Michigan, most non-disabled adults without dependents had no path to obtaining Medicaid (Ogundimu et al. 2012), although a limited program known as the Adult Benefits Waiver provided some coverage for those with annual incomes below 35% of the poverty level, which was equal to about $4,000 for a single person in 2014 (Assistant Secretary for Planning and Evaluation n.d.-a).

The Affordable Care Act as it was originally enacted in 2010 used both a carrot and a stick to incentivize states to expand eligibility for their Medicaid programs to all nonelderly individuals with income below 138% of the poverty level, or about $16,000 for a single person in 2014 (Assistant Secretary for Planning and Evaluation n.d.-a). The carrot was a high federal share of spending on coverage of the expansion population: 100% in 2014, 2015, and 2016; 95% in 2017; 94% in 2018; 93% in 2019; and 90% in 2020 and thereafter. The stick was the threat of withdrawing federal funds for the state's *existing* Medicaid program (i.e, prior to any expansion) from states that did not implement the expansion. In response, the state of Florida, joined ultimately by 25 other states, filed a lawsuit against the federal government, arguing that the threat of withdrawing existing federal Medicaid funds was coercive (KFF 2012; Rosenbaum and Westmoreland 2012).

In June 2012 the Supreme Court ruled in favor of these states: the threat to take away federal funds for existing Medicaid programs was, indeed, coercive and therefore unconstitutional (KFF 2012; Rosenbaum and Westmoreland 2012). This decision rendered Medicaid expansion effectively optional for the states. The carrot of high match rates, however, remained in place. This incentive was enough to induce 24 states and the District of Columbia to expand their Medicaid programs as envisioned by the ACA on or before January 1, 2014. Most of these states were controlled by Democrats at the state level, although there were notable exceptions such as Arizona, North Dakota, and Ohio. An additional 12 states have adopted the expansion since then, including Michigan, which implemented the ACA Medicaid expansion by establishing the HMP in April 2014. The remaining 14 states have not expanded Medicaid (KFF n.d.-a).

Modeling the Economic Impact of Medicaid Expansion

Modeling the economic impact of Medicaid expansion is a complex task, and different analysts take different approaches (Dorn 2012; Dorn et al. 2013; Dorn and Buettgens 2016; Dorn and Buettgens 2017). Here, we

focus on the relatively narrow question of how Medicaid expansion affects a state's budget. This omits important benefits, such as improved access to medical care for new beneficiaries, and the expansion's bottom-line impact on state budgets should not be the sole determinant of whether states choose to expand. But fiscal impact is, inevitably, a key concern for governors and state legislators, who decide whether or not their states should implement expansion.

The fiscal impact of proposed legislation at the state level is traditionally estimated by a state's legislative fiscal office, performing the same function that the Congressional Budget Office (CBO) does at the national level.[1] This process, sometimes referred to as "scoring," compares forecasts of expenditures and revenue under current policy (the baseline) and under the proposed legislation (Auerbach 2005). Standard scoring procedures typically omit macroeconomic feedback effects—effectively imposing the assumption that total output remains fixed—while so-called dynamic scoring incorporates these effects (Auerbach 2005; Elmendorf 2015; Gravelle 2015; Holtz-Eakin 2015a, 2015b).For example, in the case of Medicaid expansion, standard scoring would calculate the increase in state spending to cover its share of the program's cost, the reduction in state spending on other health programs, and the increase in provider tax revenue; dynamic scoring would add to these estimates the increase in *general* tax revenue associated with the overall increase in economic activity in all sectors of the state's economy. Proponents of dynamic scoring have long argued that it provides a more accurate assessment of a policy's true impact (Holtz-Eakin 2015b), and the CBO has recently expanded its use of dynamic scoring at the behest of Congress (Edelberg 2016). States have experimented with it as well for scoring tax proposals, although it is not in wide use at the state level (Bluestone and Bourdeaux 2015; Bourdeaux 2015).

While omitting macroeconomic feedbacks may understate the fiscal benefits of Medicaid expansion to a state, incorporating it adds considerable analytic complexity since it requires estimating how policy-induced changes in state and federal spending ripple through different sectors of the state's economy. The simplest approach to estimating these effects applies fiscal multipliers to the increased spending in order to estimate the corresponding increase in activity in the rest of the economy. For analyses at the

1. The National Conference on State Legislatures maintains a comprehensive list of these offices: "State Legislative Fiscal Offices Sites," www.ncsl.org/research/fiscal-policy/state-legislative-fiscal-offices-sites.aspx (accessed August 22, 2019). As we discuss below, not all states will necessarily have produced projections of the likely fiscal impact of Medicaid expansion.

national level, analysts may develop their own multipliers; examples of this approach include the Council of Economic Advisers (2014) and Bivens (2017). At the state or regional level, this type of analysis might rely on multipliers from the Regional Input-Output Modeling System (RIMS II), a widely used model developed by the Bureau of Economic Analysis (Bess and Ambargis 2011).

More sophisticated models for estimating macroeconomic feedback include Impact Analysis for Planning (IMPLAN) and the Regional Economic Models, Inc. (REMI) PI+ model. IMPLAN is an input-output model with explicit production and consumption functions that can be altered by the user, and which can account for feedback between geographic regions. However, the IMPLAN model has no time dimension, meaning that it is not possible to estimate the amount of time over which economic responses occur. Furthermore, the IMPLAN model assumes that the supply of factors is perfectly elastic at prevailing market prices. In particular, this means that the supply of labor is unlimited at current market wages.[2]

The REMI model augments an input-output model with methods from regional science and economics, including a computable nearly general equilibrium model of a state's economy.[3] The REMI model relaxes many of the assumptions imposed in the RIMS-II and IMPLAN models. For example, the REMI model does not assume that the labor supply is unlimited at current wages. Instead, in the REMI model an increase in demand for labor generates an equilibrating response in local wages, prices, and population migration to ensure "closure" of the labor market. The REMI model also incorporates a time dimension, which is lacking in the RIMS II and IMPLAN models and which allows for lags in the closure of the labor market. The time dimension in the REMI model also allows for changes in population and productivity growth. Population change by age cohort has important effects on both the labor supply and unearned income (and corresponding consumer spending) in the REMI model. Productivity growth over time means that the same real dollar input into the REMI model will generate fewer jobs over time, whereas in a static model the employment gains from a given value of real dollar spending will be constant.

Whichever model is used to estimate macroeconomic feedback, the output includes estimates of economic activity including value added, output (sales), employment, and labor income resulting from the policy,

2. Rickman and Schwer (1995) present a detailed comparison of the IMPLAN and REMI models. Neill (2013) presents a briefer, but more current, comparison of the RIMS II, IMPLAN, and REMI models.

3. As opposed to a fully general equilibrium model, the REMI model does not include endogenous closure of the government fiscal and capital markets.

which in turn can be used to calculate the increase in general tax revenue. This estimate of increased general tax revenue, added to the estimate of increased provider tax revenue, yields the total effect of expansion on the state's total tax revenue. If this amount plus the savings associated with reduced spending on other health care programs is greater than the state's share of the cost for Medicaid expansion and the prospective cost to the state from any associated increase in the state's population, then the policy yields net savings for the state. In this case, from the state's perspective, the expansion pays for itself.

State-level analyses of the economic impact of Medicaid expansion that incorporate macroeconomic feedback are relatively rare, consistent with the observations of Bourdeaux (2015) about the infrequent use of dynamic scoring by states more generally. We identified 14 studies of 13 different states and one multistate study that included macroeconomic feedback effects of Medicaid expansion; these are summarized in table 1.[4] Not all of these studies address the bottom-line effect on the state budget; those that do find mixed results about whether the expansions pay for themselves through savings and increased tax revenue.

We draw two lessons from the studies summarized in table 1. The first is that the fiscal impact of Medicaid expansion must be estimated on a state-by-state basis, by analysts with detailed knowledge of the state's budget and tax systems. This is because the fiscal impact varies a great deal depending on the state's situation and how the expansion affects the state's spending and revenue. For example, in Maryland, prior to 2014, about 70,000 nonelderly adults with incomes at or below 116% of the FPL were covered by Medicaid at the state's regular 50% match rate; shifting those individuals to coverage through the Medicaid expansion—with a match rate of at least 90%—provides "a form of evergreen savings" that is enough to cover the state's 10% share of the cost of expansion (Milligan 2012). An example at the other end of the scale is Alaska, where the absence of sales or individual income taxes means that the state will recoup very little of any increase in economy activity as revenue (Dorn and Buettgens 2016).

The second lesson from the existing studies is that methods vary widely and so does the transparency with which they are explained. One key assumption that should be fully explained, but frequently is not, is how the new spending is paid for at the federal level with either increased taxes, offsetting spending reductions, or federal borrowing. Transparency of methods is essential if this type of study will be used to inform policy.

4. For discussions of additional studies that do not necessarily incorporate macroeconomic feedback, see Dorn and Buettgens 2016, 2017.

Table 1 State-Level Studies of Medicaid Expansion that Include a Dynamic Analysis of Economic Impact

State(s)	Study	Model used	Notes
		Expansion states	
Arkansas	Price and Saltzman 2013	RIMS II[1]	Net cost to state budget in later years
Colorado	Brown, Olson, and Resnick 2013 Brown, Fisher, and Resnick 2016	RIMS II[1]	No net cost to state budget through at least 2034–35
Kentucky	Kornstein and Kelly 2015	IMPLAN[2]	Does not estimate overall state budget impact
Maryland	Fakhraei 2014; Milligan 2012	IMPLAN[2]	Fakhraei (2014) analyzes macroeconomic impact of ACA as a whole; Milligan (2012) projects net savings to state from Medicaid expansion in perpetuity
Michigan	Ayanian et al. 2017	REMI[3]	Net savings for state through at least 2020–21
New Mexico	Reynis 2012	IMPLAN[2]	Net savings for state through at least 2020
Ohio	McGee et al. 2013	REMI[3]	Net savings for the state through at least 2022
Oregon	Oregon Health Authority 2013	IMPLAN[2]	Net savings for state through 2019; net cost starting in 2020

(*continued*)

Table 1 State-Level Studies of Medicaid Expansion that Include a Dynamic Analysis of Economic Impact (*continued*)

State(s)	Study	Model used	Notes
		Nonexpansion states	
Alabama	Becker and Morrissey 2012	IMPLAN[2]	Net savings for state through at least 2020
Montana	Bureau of Business and Economic Research, Univ. of Montana 2013	IMPLAN[2]	Net savings through 2017; net cost starting in 2018
North Carolina (1)	Nystrom 2013	REMI[3]	Does not estimate overall state budget impact
North Carolina (2)	Ku et al. 2014	REMI[3]	Net savings for state through 2019; net cost starting in 2020
Texas	Perryman Group 2013	USMRIAS[4]	Does not estimate state budget impact
Virginia	Chmura 2012	IMPLAN[2]	Net cost to state on average for 2014–2019
		Multistate studies	
All	Ku et al. 2017	REMI[3]	Does not estimate state budget impact

[1]Regional Input-Output Modeling System (RIMS-II) is maintained by the US Bureau of Economic Analysis.
[2]A proprietary model maintained by IMPLAN (Economic Impact Analysis for Planning).
[3]A proprietary model maintained by Regional Economic Models, Inc.
[4]A proprietary model owned by the Perryman Group.

With these lessons in mind, we turn to an explanation of the methods used in our study of Medicaid expansion in Michigan.

The Economic Impact of Michigan's Medicaid Expansion

Effects without Macroeconomic Feedback

The starting point for our analysis is a set of projections published by Michigan's House Fiscal Agency (HFA); in some cases our analysis relies on more-detailed supplements to the published projections, which were generously shared with us by the HFA. We recognize that we are fortunate to have these official estimates for Michigan readily at hand, which are not necessarily available for all states.[5] Table 2 contains estimates of the program's cost provided by the HFA (Koorstra and Jen 2016). Estimates from the HFA represent actual spending and enrollment for fiscal years 2014 through 2016 and projections for 2017 through 2021. Monthly enrollment in fiscal year 2017 has in fact been somewhat higher than projected, averaging about 670,000 (Michigan Department of Health and Human Services 2019: table 1); we rely on the HFA projections of enrollment because the estimates of the cost offsets (discussed below) are predicated on these projections.[6] Note that because the HFA projections use fiscal rather than calendar year, we use fiscal years (October 1 through September 30) for our estimates as well.

Next, we calculate how much the state will have to pay. The state's cost has two components: administrative costs (line 4) and a share of the total cost as specified in the Affordable Care Act (line 5). Based on projections from the HFA, we assumed that the state would spend an additional $20 million in administrative costs in each year as a result of expansion (Koorstra and Jen 2016). We also followed the HFA in calculating the state's share of total health care spending (line 15), which ranges from 0 in the early years to 10% in 2021 and later.[7] In 2021, the state's total spending on the HMP is projected to be approximately $400 million.

5. In theory, all states have the capacity to produce such estimates; the National Conference of State Legislatures provides a comprehensive listing of all states' legislative fiscal offices at www.ncsl.org/research/fiscal-policy/state-legislative-fiscal-offices-sites.aspx. In practice, however, not all states have produced such estimates.

6. Data on actual enrollment in FY 2017 are from www.michigan.gov/documents/dhs/DHS-Trend_Table_01_269208_7.pdf.

7. Note that the state share shown in table 2 is the average share for the fiscal year. The ACA specifies a 100% share for the federal government through 2016 and then 95% in 2017, 94% in 2018, 93% in 2019, and 90% in 2020 and later. To calculate the state's share in each *fiscal* year, we calculated 100% (weighted average of federal share in the two adjacent calendar years). So, for example, the state's share for fiscal 2017 is 3.75%, because $0.25 \times 0\% + 0.75 \times 5\% = 3.75\%$.

Table 2 Fiscal Analysis of Medicaid Expansion Impact in Michigan without Dynamic Effects

		FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Expenditures ($ millions)									
(1)	Total	917.6	3,404.6	3,616.4	3,539.3	3,592.1	3,663.5	3,736.5	3,810.8
(2)	Federal	897.6	3,384.6	3,596.4	3,387.3	3,366.7	3,397.6	3,372.7	3,411.7
(3)	State	20.0	20.0	20.0	152.0	225.4	265.9	363.8	399.1
(4)	Administrative costs	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
(5)	Health care spending	0	0	0	132.0	205.4	245.9	343.8	379.1
State budget savings on health programs ($ millions)									
(6)	Total	100.0	235.0	235.0	235.0	235.0	235.0	235.0	235.0
(7)	Community mental health	77.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
(8)	Adult benefits waiver	12.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0
(9)	Corrections health care	10.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
(10)	Other health programs	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Additional revenue from taxes on health plans and hospitals ($ millions)									
(11)	Total	47.0	182.2	193.6	198.7	172.9	181.2	193.1	177.5
(12)	HICA revenue	6.7	20.3	21.6	26.4	28.6	29.1	22.3	0.0
(13)	Use tax revenue	40.3	161.9	172.1	42.1	0.0	0.0	0.0	0.0
(14)	QAAP revenue	0.0	0.0	0.0	130.3	144.3	152.1	170.8	177.5
Other information									
(15)	State share of health care spending	0	0	0	3.75%	5.75%	6.75%	9.25%	10%
(16)	Average monthly beneficiaries	286,300	544,400	600,000	600,000	600,000	600,000	600,000	600,000

Source: Koorstra and Jen 2016, with additional detail provided by the Michigan House Fiscal Agency (HFA).

Rows 6 through 10 of table 2 show offsetting reductions in state health care spending as a result of Medicaid expansion, based on HFA estimates (Koorstra and Jen 2016). As already noted, these offsets will vary by state, depending on how much of its own money a state had been spending on health care for individuals who would be covered by Medicaid in the event of expansion. In the case of Michigan, the HFA projects annual savings for the state in three areas (Angelotti 2013). First, many individuals receiving services through the state's community mental health system would become eligible for Medicaid; as a result, the HFA projected savings to the state of $168 million in each year between 2015 and 2021 (Koorstra and Jen 2016). Second, approximately 65,000 very low-income adults who were enrolled in the state's Adult Benefit Waiver program, which used funding from the Children's Health Insurance Program (CHIP) to cover a limited range of health care services, were automatically transitioned to the HMP (Angelotti 2014). Shifting the cost of health care for these adults to the federal government is projected to yield $47 million in savings for the state in each year once the HMP is fully in place (Koorstra and Jen 2016). Third, some state general fund spending for health care for prisoners is replaced by the HMP; the Michigan HFA estimates these savings at $10 million to $19 million per year between 2014 and 2021 (Koorstra and Jen 2016). Savings for other state programs (primarily a Medicaid waiver program called "Plan First" that covered contraception) are estimated at $1 million annually (Koorstra and Jen 2016).[8]

In total, these annual fiscal offsets have been estimated by the HFA at $235 million annually between 2015 and 2021. In 2015 and 2016, when the state's costs related to the expansion are limited to administrative costs, this results in a net gain of over $200 million per year. In 2017, when the federal share of the Medicaid expansion began to decrease, the net savings fall to $83 million ($235 million in row 6 minus $152 million in row 3). Starting in 2020, when the state will be responsible for 10% of medical expenditures for the expansion population, the fiscal offset associated with reduced spending on state-funded health programs is projected to cover roughly 60% of the state's share of program costs.

The analysis must also account for additional tax revenue that arises directly from the increased health spending. Like nearly every state,

8. The HFA did not assume any savings associated with pregnancies covered by the HMP that would otherwise have been covered by traditional Medicaid with its lower match rate; applicants to the HMP may not be pregnant at the time of application and are given a choice of enrolling in traditional Medicaid if they become pregnant. Other states may want to consider the possibility of such savings in the event of Medicaid expansion, depending on their program rules.

Michigan has used three provider taxes to help finance its Medicaid program since well before the ACA (KFF 2017).[9] The increase in insurance coverage associated with Medicaid expansion has led to an increase in revenues for health plans and providers, which in turn has led to more tax revenue being generated by these three taxes. For all three of these sources of revenue, we rely on estimates from the HFA of the increases that are projected to result from the HMP. Starting in fiscal year 2015, when the Medicaid expansion was in place for the first full year, these additional provider taxes generate between $173 and $199 million in additional revenue (Koorstra and Jen 2016).

The numbers in table 2 show that in Michigan the state's savings on other programs (line 6) plus the increase in revenue from provider taxes (line 11) is more than enough to pay for the state's share of costs (line 3) in every year that we examine. In other words, even before we consider the macroeconomic feedback effects on the rest of Michigan's economy, Medicaid expansion in Michigan pays for itself.

Macroeconomic Feedback Effects

The dynamic analysis incorporates the macroeconomic feedback associated with the increase in spending related to the HMP. We chose the REMI model for this component of the analysis because of the importance of modeling the year-by-year impacts of the HMP and the model's realistic dynamic employment and demographic responses, which are described in detail elsewhere (REMI 2018). The REMI model has been used extensively to support economic and fiscal planning by the Michigan state government; it has also been used in peer-reviewed studies of tobacco-related employment in Michigan and the United States (Warner and Fulton 1994; Warner et al. 1996).

The dynamic analysis requires us to specify the paths of federal and state spending over time both with and without the additional spending as a result of the HMP. The baseline forecast of the Michigan economy—that is, the no-expansion scenario—was generated by the REMI Corporation using information from the University of Michigan's Research Seminar in

9. Michigan has three different taxes on health plans and health care providers for which revenue is projected to increase substantially because of Medicaid expansion: a tax on health insurance plans known as the Health Insurance Claims Assessment (HICA), a Medicaid Managed Care Use Tax ("Use Tax"), and the Quality Assurance Assessment Program ("QAAP") tax imposed on hospitals and long-term care services (Angelotti 2015). The legal and political future of these programs is complex and uncertain (Greene 2016).

Quantitative Economics (RSQE)[10] national forecast from November 2015 (Ehrlich et al. 2015) and the Bureau of Labor Statistics long-run forecast published in December 2015 (Richards 2015). Under expansion, there is an infusion of federal spending into the state. Table 3 reports the inputs used to calculate the amount of this infusion. The estimates of federal and state spending presented above (lines 1 through 3 in table 2) are our starting point and are reproduced as lines 1 through 3 of table 3. But we must also specify how much new federal spending would have occurred even in the nonexpansion scenario as a result of new federal tax credits for health insurance, how any new spending is distributed within the Michigan economy, and how it is financed. We describe those steps here.

How Much Would Federal Health Spending in Michigan Have Increased Even without Medicaid Expansion? If Michigan had not expanded its Medicaid program in 2014, more Michigan residents would have become eligible in 2014 for new federal tax credits to subsidize the purchase of health insurance, reducing the net inflow of federal money associated with expansion (Haislmaier and Gonshorowski 2012). To be eligible for these tax credits, individuals must have family income between 100% and 138% of FPL and must not have access to other affordable coverage such as Medicaid or employer-sponsored coverage. The majority of HMP enrollees would not have been eligible for these credits because their incomes are below the poverty level; administrative reports from the state of Michigan indicate that only about 18% of HMP enrollees are above the poverty level. It is this 18% who would have been eligible to receive premium tax credits. Although program take-up among eligible adults is typically well below 100%, we assume that most of these individuals would in fact have obtained tax credits. In national data, 79% of eligible individuals with incomes between 100% and 150% of FPL in nonexpansion states enroll in marketplace plans (Buettgens, Kenney, and Pan 2015), so we assume 79% take-up in our sample.

Thus, in the absence of the HMP, 14.2% (18% × 79%) of HMP enrollees would have received federal premium tax credits. Each of these would qualify for a credit that is slightly less than the cost of the second-cheapest silver plan in their area, known as the "benchmark premium."[11] We assume

10. "Research Seminar in Quantitative Economics," College of Literature, Science, and the Arts, University of Michigan, lsa.umich.edu/econ/rsqe.html (accessed August 22, 2019).

11. The tax credit is calculated as the cost of the second-cheapest single plan minus the household's required contribution of 2% of modified adjusted gross income. This contribution is about $240 at the poverty line.

Table 3 Selected Inputs for the Macroeconomic Model of Medicaid Expansion in Michigan

		FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Expenditures ($ millions)									
(1)	Total	917.6	3,404.6	3,616.4	3,539.3	3,592.1	3,663.5	3,736.5	3,810.8
(2)	Federal	897.6	3,384.6	3,596.4	3,387.3	3,366.7	3,397.6	3,372.7	3,411.7
(3)	State	20.0	20.0	20.0	152.0	225.4	265.9	363.8	399.1
Federal premium tax credits to Michigan residents in the nonexpansion scenario ($ millions)									
(4)	Total	117.4	435.7	462.8	453.0	459.7	468.9	478.2	487.7
State budget savings on health programs ($ millions)									
(5)	Total (from table 2, line 6)	100.0	235.0	235.0	235.0	235.0	235.0	235.0	235.0
Private sector health care savings ($ millions)									
(6)	Total	180.3	679.9	722.5	707.0	717.6	731.9	746.6	761.5
(7)	Insured households	43.9	165.4	175.8	172.0	174.6	178.1	181.6	185.3
(8)	Businesses	75.6	285.1	302.9	296.4	300.9	306.9	313.0	319.3
(9)	Uninsured households	60.8	229.4	243.8	238.5	242.1	247.0	251.9	256.9
Other private sector effects ($ millions)									
(10)	Increased federal tax payments	18.7	70.8	75.2	70.4	69.8	70.3	69.5	70.2
(11)	Lost sales to other states	8.6	32.4	34.4	32.2	31.9	32.2	31.8	32.1
Net federal stimulus ($ millions)									
(12)	Total (12) = (2) − (4) − (10) − (11)	752.9	2,845.8	3,024.0	2,831.7	2,805.3	2,826.3	2,793.2	2,821.7

that the value of this tax credit would be approximately equal to 90% of average per-enrollee spending in the HMP, or about $5,400.[12] This implies an annual federal subsidy of $5,400 for each of the approximately 85,200 (14.2% of 600,000) HMP enrollees who would have received health insurance tax credits in the absence of HMP. The total amount of additional federal tax credits that Michigan residents would have received in the absence of the HMP ranges from $117 million to $487 million in each year (table 3, line 4), or 13% of the total cost of the Medicaid expansion (table 3, line 1). Our macroeconomic model takes into account that the baseline scenario would have included this increase in federal spending, effectively reducing the net increase in federal spending associated with the HMP by 13%.

Where Does the Money Go? The macroeconomic impact of the infusion of spending will depend on how and where that money is spent. Spending that stays in the state will have a greater impact on state tax revenues than spending that goes outside the state. The split between in-state and out-of-state spending will depend on how much of the federal funding flows through the health care sector rather than other parts of the economy. This, in turn, will depend on whether federal funding displaces health spending that would have occurred in the absence of Medicaid expansion as opposed to representing an increase in health care utilization by the newly insured.

We have already noted that the state budget experiences offsetting savings as a result of the HMP; these were detailed in table 2, line 6, and reproduced in Table 3, line 5. Private payers will also experience savings as federal spending on HMP enrollees replaces money that individuals and their employers (in the case of employer-sponsored insurance) would have spent on health care; these resources will be freed up for spending on other goods and services. Most of that windfall will be spent outside the health care sector. In contrast, federal funding for "new" health care spending—that is, for the additional utilization of services induced by the increase in insurance coverage—will stay within the health care sector.[13] These two channels will

12. Nationally, the average premium tax credit was $371 per month in 2017 (CMS 2017), or $4,452 per year. However, this statistic includes *all* recipients, with incomes ranging from 100% to 400% of the FPL. Since the tax credits are designed to be higher for lower-income recipients, it makes sense that our assumption about the value of the credit that HMP enrollees would have received in the absence of enrollment is greater than the average credit.

13. Specifically, we assume that the state government's savings is spent on general state government activities and that private individuals spend their savings purchasing non–health care goods and services. In our baseline analysis, we assume that private-sector employers benefit from a reduction in operating costs, which enhances their competitiveness and allows them to gain market share. In the sensitivity analyses described in the fifth section, we consider alternative assumptions in which employers pass these savings on to their employees as increased wages.

have different effects on the Michigan economy and state tax revenues because a lower share of nonhealth spending stays within the state.

In the first years after the expansion, per-capita health expenditures for HMP enrollees were approximately $6,000 per year. The share of this amount that can be seen as replacing private spending will depend on (1) how many HMP enrollees would have had private insurance and how many would have been uninsured, and (2) how much would have been spent on health care if the HMP had not been established.

For simplicity, we will assume that individuals who moved from private insurance to HMP consumed the same amount of health care before and after the expansion. Thus, for this group we assume that federal funding simply replaces private expenditures; the money that would have otherwise been spent on health care will now be redirected to other goods and services. The magnitude of this effect will depend on the fraction of new enrollees who would have had private insurance in the absence of the HMP, and the savings will flow to both insured households and private businesses roughly in proportion to their share of that coverage. We rely on a 2016 survey of approximately 2,000 enrollees in the HMP that was conducted as part of the official evaluation of the HMP required by the Center for Medicare and Medicaid Services, in which respondents were asked about their prior coverage, among other topics (Goold et al. 2016). Responses to this survey indicate that during the year prior to enrollment, 9.6% of enrollees were covered by employer-sponsored health insurance, and 3.7% of enrollees were covered by nongroup private insurance (2016). We assume that all of these individuals would have kept private coverage in the absence of the HMP.[14] Based on this assumption, we project that the substitution of federal funds for private spending would generate private-sector savings for previously insured households and private businesses of between $451 million and $505 million annually between fiscal years 2015 and 2021 (Table 3, lines 7 and 8).

For HMP enrollees who were previously uninsured, the program also displaces private spending that would have occurred anyway, but such offsets represent a small share of the $6,000 per-capita spending. Based on a published analysis using national data, we estimate that individuals who did not previously have health insurance were each spending an average of about $490 per year on out-of-pocket health care expenses in 2013, or about 10% of their total consumption of health care (Coughlin et al. 2014). As in

14. In sensitivity analyses discussed below, we assume that half or none of these individuals would have kept private insurance in the absence of the HMP.

the case of the previously insured, this amount can now be spent on other things. In aggregate, this stream of spending amounts to between $285 million and $319 million in new nonhealth spending (table 3, line 9). The remaining $5,500 in per enrollee spending represents new health spending.[15]

The bottom line from these calculations is that of the approximately $3 billion in additional annual health spending relative to the baseline without the HMP, we estimate that about one-third replaced existing health care spending and two-thirds represents "new" health care spending. To determine how the "new" health care spending is allocated, we used the results of actuarial models stratified by age and sex developed by Milliman, Inc., for the Michigan Department of Health and Human Services to estimate the relative distribution of spending in the HMP across six categories of health care services (inpatient and outpatient hospital facility fees; physician and other professional medical services; dental services; paramedical services such as home health services, medical transport, and laboratory services; pharmacy benefits; and durable medical equipment) based on the actual health care spending for HMP enrollees in fiscal year 2015 (pers. comm., Penny Rutledge, Michigan Department of Health and Human Services, September 20, 2016).[16]

How Is New Spending Financed? To estimate the economic impact of Medicaid expansion it is necessary to specify not only the amount of new federal and state spending and where it is spent, but also whether this spending will be financed with tax increases or spending cuts in other areas. The default assumption in the REMI model is that increased government spending is deficit financed. If programs are funded by increased taxes, those increases must be specified explicitly by the analyst. There is no long-run government budget constraint embedded in the REMI model, so that deficit finance implicitly has no detrimental consequences. Therefore, a

15. A recent study suggests that uninsured patients receive an average of $800 of uncompensated hospital care per year (Garthwaite, Gross, and Notowidigdo 2018). We treat the replacement of this uncompensated care with publicly financed care as equivalent to "new" care. The reason is that previously this care did not generate any labor income. Thus, when providers begin receiving payments for medical services that were previously provided for free, the economic value of health care services increases. However, hospitals that provide free care to uninsured patients receive some compensation from federal, state, and local governments. Following conversations with the Michigan HFA, we have assumed that local governments in Michigan will spend $32 million less per year on health care services.

16. The new spending was introduced into the REMI model on the industry side as an increase in demand for healthcare services; the Medicaid component of personal income was not adjusted directly. Although Medicaid spending is a component of personal income, entering the new spending into the model directly both on the industry side and on the personal income side would involve double counting. We did not do this.

serious limitation of analyses that neglect to specify the financing mechanism of government programs is that they overstate net benefits by ignoring program costs.

For federal spending, we assumed the federal government would finance the expansion through increased taxes. Note that this represents a conservative assumption; the CBO projected that spending for the ACA's new programs (which include not only Medicaid expansion but also premium tax credits) over the 2016–20 window would be financed approximately equally by reductions in outlays for existing programs and increases in taxes (CBO 2015; table 2). By assuming that all of the Medicaid expansion is financed by increased federal taxes, we are deliberately making a conservative assumption in the sense that higher federal taxes in the model translate directly into less economic stimulus for Michigan residents. The vast majority of the burden of new federal taxes will fall on residents of other states, but some of it will fall on Michigan residents. Thus, we assume that Michigan residents will pay higher federal taxes because of the decision to expand Medicaid in Michigan. In fiscal year 2015, residents and businesses in Michigan paid 2.4% of all federal taxes (IRS 2016: 12, table 5). We assumed that Michigan residents would bear this portion of any federal tax increase required to pay for the HMP. This assumption implies an increase in federal taxes paid by Michigan residents of between $70 million and $75 million annually in each year between 2015 and 2021 (table 3, line 10). This increase in federal tax payments translates to reduced spending by Michigan residents on goods and services, which in turn leads to lower state tax revenues. Note that the increased tax paid by Michigan residents to fund the Medicaid expansion in other states is not included in our analysis, because these taxes do not depend on Michigan's decision regarding Medicaid expansion.

Our analysis also takes into account the fact that residents of other states will pay higher federal taxes in order to finance Michigan's Medicaid expansion. This affects the Michigan economy by reducing disposable income that these individuals might have spent on Michigan goods and services. For 2015, the REMI model estimated that Michigan goods and services accounted for 1.13% of all goods and services purchased in other states. Thus, Michigan businesses would lose between $32 million and $34 million annually in sales to residents of other states in each year between 2015 and 2021 (table 3, line 11).

For state spending, one could in principle model the impact of increasing broad-based state taxes on Michigan residents to support the state's spending on the HMP. However, because the first stage of our analysis

concluded that the HMP yields net savings for the state, such broad-based increases are not required and are not included in our analysis.

The net federal stimulus—which is a key input into the macroeconomic model—is calculated as nominal federal spending on the HMP (table 3, line 2) minus the various offsets described above for tax credits that would have occurred in the nonexpansion scenario (table 3, line 4), increases in federal tax payments by Michigan residents (table 3, line 10), and Michigan businesses' lost sales to residents of other states (table 3, line 11). The resulting net federal stimulus is between $2.8 and $3.0 billion dollars in each year between 2015 and 2021 (table 3, line 12).

Output from the Macroeconomic Model. The key outputs from the REMI model are presented in table 4. During this time period, additional employment associated with increased Medicaid spending peaked at over 36,000 jobs in 2016 and is projected to decline to approximately 28,000 jobs in 2021 (table 4, line 1). To put these numbers in perspective, data from the federal Bureau of Economic Analysis (BEA) indicate that total employment in Michigan was about 5.4 million in 2014, and that employment in the health care and social assistance sector accounted for about 652,000 of these jobs.[17] Year-over-year job gains in Michigan were about 66,000 in 2012, about 89,000 in each of 2013, 2014, and 2015, and 107,000 in 2016. In the health care sector, employment grew by 8,572 jobs in 2012 before weakening to show employment gains of only 124 in 2013 and a decline of 29 jobs in 2014. Coincident with the full-year expansion of the Medicaid Program, employment growth in the health care sector picked up to 10,807 in 2015 and 15,509 in 2016. Thus, the magnitudes of the employment increases as a result of Medicaid expansion predicted by the REMI model are consistent with the observed changes in BEA employment data for the state of Michigan.

The additional jobs in Michigan are filled from one of four sources: a reduction in the number of unemployed workers, an increase in the labor force participation rate, an increase in the working-age population, or workers who are displaced from other jobs due to an increase in labor cost. In the first few years of the simulation, the jobs are primarily filled by a reduction in the number of unemployed persons and an increase in

17. Employment statistics are from the Bureau of Economic Analysis (BEA) Regional Economic data series (the same data series used in the REMI model). These data tend to be somewhat higher than the more widely reported Bureau of Labor Statistics data because the BEA data includes all self-employed workers who file a schedule SE tax return. "Regional Economic Accounts," Bureau of Economic Analysis, www.bea.gov/regional/index.htm (accessed August 22, 2019).

Table 4 Macroeconomic Model Output

		FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Increase in employment (jobs)									
(1)	Total	7,181	28,113	36,509	34,971	32,683	31,227	29,197	27,567
(2)	State/local government	1,506	4,815	6,183	5,450	4,447	3,977	3,256	2,667
(3)	Hospitals and ambulatory health Care	1,847	8,044	10,140	9,673	9,378	9,196	8,984	8,886
(4)	Other private sector	3,828	15,254	20,186	19,848	18,859	18,054	16,957	16,014
Increase in population (persons)									
(5)		1,725	8,001	15,003	20,586	24,996	28,624	31,448	33,676
Increase in personal income ($ millions)									
(6)		356.2	1,446.4	2,028.0	2,124.1	2,150.0	2,197.8	2,189.7	2,190.0
Increase in state tax revenue from economic benefits									
(7)	Total ($ millions)	23.6	96.4	134.5	139.7	139.7	140.7	138.0	135.9
(8)	Per new resident ($)	13,680	12,049	8,695	6,786	5,589	4,915	4,388	4,035
Addendum:									
(9)	Total state tax revenue per capita ($)	2,533	2,718	2,763	*2,839*	*2,917*	*2,998*	*3,080*	*3,165*

Total state tax revenue per capita for fiscal years 2011 to 2016 is taken from www.census.gov/programs-surveys/gov-finances/data/datasets.html. Data for fiscal years 2017 to 2021 this line are presented in italics and are based on an extrapolation using the fiscal years 2011 to 2016 annual growth rate of 2.76% per year.

Table 5 Putting It All Together Impact of Medicaid Expansion in Michigan on the State Budget including Dynamic Effects, Fiscal Years 2014 through 2021

		FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY2021
(1)	State spending on expansion ($ millions)	20.0	20.0	20.0	152.0	225.4	265.9	363.8	399.1
(2)	State budget savings on other health programs and other programs (million $)	100.0	235.0	235.0	235.0	235.0	235.0	235.0	235.0
(3)	State taxes and contributions from health plans and hospitals (millions $)	47.0	182.0	194.0	198.0	163.0	171.0	193.0	178.0
(4)	Increase in state tax revenue from economic benefits ($ millions)	23.6	96.4	134.5	139.7	139.7	140.7	138	135.9
(5a)	Increase in state cost from net new residents (0% current tax rev. per cap.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(5b)	Increase in state cost from net new residents (50% current tax rev. per cap.)	2.2	10.9	20.7	29.2	36.5	42.9	48.4	53.3
(5c)	Increase in state cost from net new residents (100% current tax rev. per cap.)	4.4	21.7	41.5	58.4	72.9	85.8	96.9	106.6
(6a)	Net effect on state budget (no additional cost for net new residents) (6a) = (2) + (3) + (4) − (5a) − (1)	150.6	493.4	543.5	420.7	312.3	280.8	202.2	149.8
(6b)	Net effect on state budget (50% of per capita cost for net new residents) (6b) = (2) + (3) + (4) − (5b) − (1)	148.4	482.5	522.8	391.5	275.8	237.9	153.8	96.5
(6c)	Net effect on state budget (100% of per capita cost for net new residents) (6c) = (2) + (3) + (4) − (5c) − (1)	146.2	471.7	502.0	362.3	239.4	195.0	105.3	43.2

Sources: Rows (1), (2), and (3) are from the Michigan House Fiscal Agency (Koorstra and Jen 2016). Row (4) is model output from our analysis. Row (5) is calculated as indicated in the table.

Note: All amounts for state expenditures, state taxes, and contributions for health plans and hospitals, and state budget savings are shown in nominal dollars unadjusted for inflation, as reported by the House Fiscal Agency.

the labor force participation rate. Over a longer period of time the REMI model estimates that most of the increased demand for labor is met by an increase in the working-age population through a change in the rate of domestic migration. Net domestic migration of the population 64 and younger is determined by employment opportunities in the region compared to the nation, the cost of living adjusted after tax compensation rate in the region compared to the nation, and a fixed amenity value that is time invariant for each region. The employment opportunities variable, measured by the ratio of employment to the labor force, has a much greater influence on migration than compensation does. As can be seen in table 4, in our simulation, the HMP's impact on Michigan's population increases over time, but at a diminishing rate, due to lags in the migration response to increased employment opportunities. In the case of Michigan, this means that the rate of domestic out-migration would slow; fewer people would be moving out of the state.[18] In other words, the long-run employment impacts of Medicaid expansion come about in the REMI model through an outward shift in the local labor supply curve, which itself arises because the Medicaid expansion effectively relaxes the statewide budget constraint via a large infusion of federal funds.

The gradual increase in Michigan's working-age population generated by the economic feedback effect would increase the demand for state government services, potentially also increasing state costs. Unfortunately, several factors make calculating the dollar value of those additional costs difficult and potentially controversial:

- First, there is not a consensus in the academic literature regarding the extent to which state government expenditures increase with state population growth. Oates (1988) reports, "In sum, empirical study of the congestion properties of local services is not going to be an easy matter. There are a number of effects that need to be disentangled, and the data required for this unravelling of effects does not appear to be readily available." In their critical survey of empirical estimates of the demand for local public services, Reiter and Weichenrieder (1997) report only two studies that report "crowding" estimates for state-level general expenditures.

18. According to the Census Bureau, domestic out-migration from Michigan has slowed from an average of 34,148 per year between 2010 and 2013 to only 12,698 in 2017, a pattern of domestic migration that is consistent with the simulation results. See "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2018," available at www.census.gov/data/tables/time-series/demo/popest/2010s-state-total.html (revised May 23, 2019; accessed August 22, 2019). .

- Second, the REMI model provides little regarding the socioeconomic characteristics of new migrants to the state induced by the HMP, but those characteristics are likely to be important drivers of the increased demand for state government services.[19] Michigan's Executive Budget for 2019 projects that approximately 74 percent of state spending will be devoted to Health and Human Services and Education (Snyder and Walsh 2018). Our strong prior assumption is that because the estimated net increase in population due to the HMP comes from economic migrants, whose location decisions are driven by employment opportunities; the spending needs associated with those residents should be smaller than current average statewide spending per capita.
- Third, there is a philosophical argument that counting these costs is asymmetrical with how we treat the HMP's benefits for state residents. We ignore the plan's benefits in terms of improving residents' health and financial security, except to the extent that those benefits have direct macroeconomic or fiscal effects.[20]

These reasons may help to account for Bartik's (2018) observation that it is uncommon in the field of economic impact modeling to account for the increase in state government expenditures resulting from state population growth.

To provide a rough assessment of the potential increase in state costs from additional residents, we present three sets of baseline results: the first assumes no increase in costs from the additional residents, the second assumes that each new resident increases state costs by half of the state's per-capita tax revenues, and the third assumes that each new resident increases state costs by the full amount of the state's per-capita tax revenues.[21]

About two-thirds of the additional jobs associated with the increased Medicaid spending are outside the health care sector, which can be explained

19. The REMI model reports gender, age broken into a number of buckets, and four race categories for its so-called economic migrants. It does not report characteristics such as average income, education, occupation, or employment probability.

20. We estimate that the HMP will cover an average of 600,000 monthly beneficiaries by fiscal 2021, versus an increase in the state's population of 34,000 residents.

21. Those calculations are motivated by the implicit assumption that the state runs a balanced budget, so that spending equals revenues. The Michigan Constitution contains a balanced budget amendment, so this assumption is reasonable, although it does not hold exactly in practice. We focus on tax revenues rather than total spending because the state also spends money from federal transfers that are tied closely to population levels and should not have an important effect on the state's net fiscal position in response to changes in population. That is, focusing on tax revenue per capita is a way of focusing on the state's spending from its own resources.

by two factors. First, as noted above, about one-third of the HMP spending replaces preexisting healthcare spending by the state, employers, and individuals. As the federal government assumes responsibility for this spending, it frees up state and private resources to be spent in other areas. Second, about half of the total jobs created by the direct macroeconomic stimulus arise from the overall expansion of economic activity as new spending spreads through the economy.

Over this time period, the increased personal income associated with new employment is relatively stable, between $1.4 billion and $2.2 billion per year. The decline in additional employment after 2016 results from three major factors. First, the state's share of program costs begins to rise in 2017. Second, the equilibrating forces of the REMI model put upward pressure on Michigan wages in response to the economic expansion, reducing additional employment. Third, inflation-adjusted spending on the HMP is assumed to be roughly constant after 2018, but labor productivity is forecast to continue growing, reducing the number of jobs created per dollar of spending.

The increase in personal income allows us to estimate the increase in revenue from broad-based state taxes. We estimated the increase in Michigan state government tax revenue related to additional macroeconomic activity generated by the expansion of Medicaid using a mathematical model developed by the Research Seminar in Quantitative Economics at the University of Michigan. This model was originally developed for use by the Michigan Economic Development Corporation to evaluate potential tax subsidies for economic development projects. The model uses the REMI-generated change in the components of personal income to calculate aggregate state government tax revenue generated by the new activity. In calculating the tax revenue generated by the simulation experiment we included all wages and salary and proprietors' income but only a portion of capital income and transfer payment income since some of these latter income categories are not subject to taxation, such as medical care transfer payment income.

In this policy experiment the additional state government tax revenue ranged from 6.2% to 6.7% of total personal income during fiscal years 2014 through 2021. The model was developed using historical tax revenue data and guidance from the Michigan Department of Treasury, which has estimated the distribution of new state tax revenue from sales and use taxes (39.4%), individual income tax (37.3%), state education tax via property tax (8.1%), tobacco tax (4.2%), corporate income tax (4.1%), gambling tax (3.8%), and other taxes (3.1%). Line 7 of table 4 reports our estimate of the

total increase in state tax revenue, which is approximately $140 million per year in FY 2016 and thereafter.

Dividing the increase in state tax revenue by the additional residents in the state produces an estimate of additional state revenue per new resident. In fiscal year 2014, we estimate that the HMP's economic benefits generate $13,680 in state tax revenue per new resident; that number declines quickly as the estimated population impact grows (table 4, line 8). As the number of new residents increases to almost 34,000 in fiscal year 2021, the increase in state revenue from the economic benefits of the HMP falls to $4,035 per new resident.

The last line of table 4 shows total Michigan State government tax revenue per capita for fiscal years 2014, 2015, and 2016, and a simple extrapolation through fiscal year 2021.[22] In fiscal year 2014 this amounted to $2,533 per capita, and in fiscal year 2021 it is estimated to be $3,165 per capita. If each new resident cost the state of Michigan as much as the average existing resident these values would represent the cost to the state of adding an additional resident.[23]

The additional state tax revenue per new resident generated by the HMP substantially exceeds the historical state government tax per resident and prospective future values through fiscal year 2021. These calculations imply that the HMP will generate additional state tax revenue in excess of the cost of providing services to the state's additional residents at least through fiscal year 2021, although the trend lines suggest that this net gain is diminishing and will fade away given enough time.

Adding the Results of the Dynamic Analysis: The Bottom Line

Table 5 combines the key results from the dynamic analysis in table 4 with results from table 2 to calculate the overall state budget impact of the HMP in each year. The state's cost of expansion (table 5, line 1) is offset by state

22. The extrapolation is based on the average growth rate in the state between fiscal years 2011 and 2016, 2.76% per year.

23. As noted above, the implied comparison above assumes that the state will need to raise new tax revenue equal to its current per-capita average in order to maintain state services at their current quality. We believe that in reality new economic migrants to Michigan will generate marginal costs per capita below average costs, at least for a substantial time into the future. New migrants attracted by Michigan's improved labor market conditions will be disproportionately working age relative to Michigan's current population, so they are likely to put less pressure on schools, pensions, and other social services. Additionally, Michigan is projected to face domestic out-migration in this period and has lost population from its peak in the mid-2000s, so it arguably has excess capacity in certain areas such as physical infrastructure.

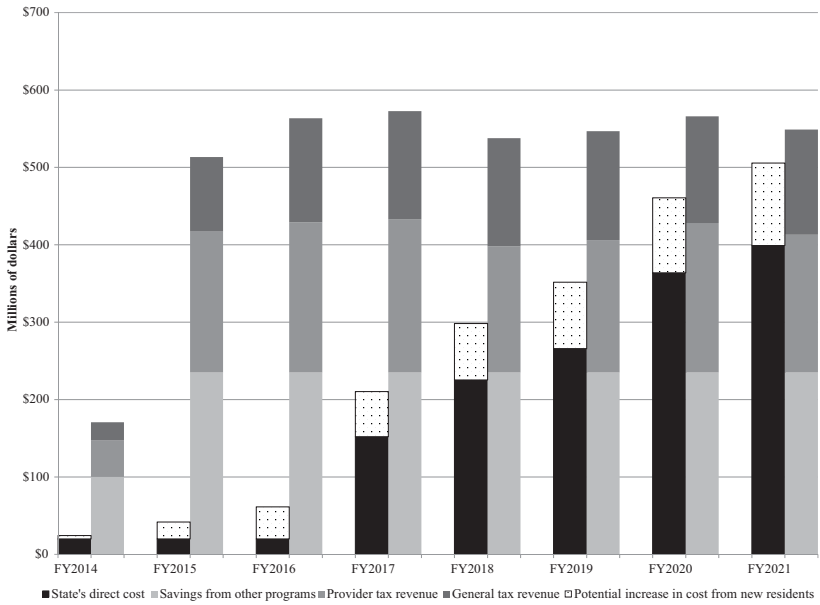

Figure 1 State costs and savings/revenue associated with Medicaid expansion in Michigan, FY 2014–21.

savings on other health programs (line 2), an increase in revenue from taxes on health care providers (line 3), and an increase in general tax revenue associated with increased economy activity (line 4). Lines 5a through 5c display the range of potential costs associated with the increased state population. Regardless of those costs, the costs of Medicaid expansion in the state budget are fully covered through 2021, as shown in lines 6a through 6c. Indeed, state budget savings and additional provider tax revenue associated with increased health spending alone (i.e., without new general tax revenue) are sufficient to cover the state's share of the program's cost in each year we analyzed. Adding increased general state tax revenue, net of expected costs associated with the increased population from the increase in overall economic activity resulting from the influx of federal dollars makes expansion an even better financial deal for the state. Figure 1 summarizes these findings graphically. The black bar in each year represents the state's direct cost for the expansion, while the white speckled bar displays the highest potential cost of providing services to new state residents that we considered. The three gray bars represent the state's savings from other programs, provider tax revenue, and net general tax revenue as

a result of expansion. The sum of the three gray bars is greater than the sum of the black and white bars in every year.

Sensitivity Analyses

Our analysis of macroeconomic feedback effects requires numerous assumptions, many of which are uncertain, such as the extent to which the HMP replaced existing state and private spending as opposed to representing truly new spending on health care. However, the impact of this uncertainty on our results is quite limited because these assumptions do not affect how much new spending is injected into the state economy, but rather where that spending takes place and how much of it remains within the state. New health spending that would not have occurred in the absence of the Medicaid expansion will immediately flow to health care providers and then to other parts of the economy. In contrast, Medicaid spending that replaces prior spending by consumers will lead directly to an increase in spending outside the health care system. To the extent that a smaller fraction of nonhealth spending stays within the state—68% of health spending remains within the state compared with only 54% of nonhealth spending—the effect on the state economy and state tax revenues will be smaller. For simplicity, all of the sensitivity analyses in this section start from the baseline assumption that the increase in the state's population does not lead to increase in state costs—that is, they are comparable to line 6a in table 5.[24]

The model's lack of sensitivity to different assumptions can be seen by varying several assumptions:

1. **What fraction of HMP enrollees would have had private insurance in the absence of HMP?** Our baseline estimate is that 13.3% of enrollees would have kept private insurance in the absence of the HMP; in the sensitivity analyses, we assume that half (6.7%) or none (0%) of these individuals would have kept private insurance in the absence of the plan.
2. **How much would HMP enrollees who would have been uninsured in the absence of HMP have spent on their own medical**

24. The extent to which the increased population increases state costs is another important source of uncertainty regarding the program's effect on the state budget. We analyzed the results' sensitivity to that issue as part of the main analysis for two reasons. First, it is arguably of more central importance than the issues considered in this section. Second, we wanted to show the dynamic impact of those potential costs, which start out small and grow over time; the sensitivity analyses in this section focus only on fiscal year 2021.

care? Our baseline estimate is that uninsured individuals would have paid for about 10% of their total HMP healthcare expenses out-of-pocket in the absence of the plan, based on observed spending patterns of the uninsured in 2013 (Coughlin et al. 2014). In the sensitivity analyses, we consider values of 25% and 40% for that proportion.

3. **What do businesses do with their savings?** We estimate that business establishments are able to save between $285 million and $319 million per fiscal year in spending on health insurance for individuals who now are covered by HMP. The baseline analysis assumes that businesses keep the entire savings rather than transmitting them to workers through higher compensation. In a sensitivity analysis, we assume instead that these savings are distributed to workers across 18 relatively low-wage industries, such as retail trade and restaurants, in which employees are most likely to qualify for HMP coverage.

Table 6 summarizes the results of sensitivity analyses that vary these assumptions compared with the results of our baseline analysis for FY 2021. Overall, the results are very similar, varying by less than 20% from the baseline simulation in column 1 despite using some of the most extreme alternative assumptions we assessed. The one exception is the share of total jobs created in the health care industry, as one would expect, because the primary difference between these scenarios is how much new money is being spent on health care services and how much is freed up to spend on other goods and services. Overall, these sensitivity analyses suggest that the dynamic analysis is quite robust to alternative assumptions.

Limitations

Our results are subject to a number of limitations. The most significant of these is the uncertainty inherent in any economic modeling, particularly modeling that involves forecasting the future. While our results are robust to varying certain assumptions, as demonstrated in the previous section, the uncertainties we examine in our sensitivity analysis are relatively minor in comparison to those in a true forecasting exercise in a nonexpansion state.

Therefore, it is instructive to compare our results to other analyses that attempt to measure fiscal multiplier effects. Because there is no single value for or parameter governing the fiscal multiplier in the REMI model, we

Table 6 Sensitivity Analyses: Employment Increases, Personal Income Increases, and Net Effect on State Budget Fiscal Year 2021 Associated with Medicaid Expansion in Michigan

	Scenario								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Assumptions									
What fraction of new enrollees would have had private insurance without expansion?	13.3%	6.7%	0.0%	13.3%	13.3%	13.3%	6.7%	13.3%	13.3%
How much would new enrollees who would have been uninsured without expansion have spent on their own health care?	10%	10%	0%	25%	40%	10%	10%	25%	40%
Who gets businesses' health care savings?	Business	Business	Business	Business	Business	Workers	Workers	Workers	Workers
Key results for FY 2021:									
Increase in employment (jobs)	27,567	26,147	25,156	27,018	26,467	23,537	24,134	22,988	22,437
Share of increase in Healthcare sector (%)	32.2	37.0	46.8	26.7	21.0	37.8	40.1	31.4	24.8
Effect on personal income ($ millions)	2,190.0	2,117.8	2,114.0	2,102.1	2,013.9	2,208.2	2,127.0	2,120.3	2,032.1
Effect on state budget—no costs from population increase ($ millions)	149.8	146.0	146.6	144.2	138.5	156.6	149.4	151.0	145.3

Note: Scenario (1) is the baseline for which detailed results are also reported in tables 3, 4, and 5. All other scenarios are sensitivity analyses reflecting alternate assumptions. The calculated "effect on state budget" in the bottom row does not account for any increase in costs associated with the estimated increase in state population.

instead focus on the implied "cost per job" in our analysis. In fiscal year 2016, we estimate that federal expenditure on the HMP was nearly $3.6 billion, and that the program led to more than 36,000 additional jobs in Michigan. The implied cost per job is roughly $100,000. For fiscal year 2021, we estimate federal expenditure of $3.4 billion leading to about 27,500 additional jobs, for an implied cost per job of roughly $124,000.[25]

Chodorow-Reich (2017) summarizes a set of studies that estimated fiscal multipliers based on components of the American Recovery and Reinvestment Act (ARRA) of 2009. He reports, "The cost-per-job across these studies ranges from roughly $25K to $125K, with around $50K emerging as a preferred number." Our cost-per-job estimates are toward the top end of the reported range, implying a relatively conservative estimate of the fiscal multiplier effect. In other words, we estimate that it takes a relatively larger number of dollars of stimulus to produce one additional job than most of the studies of the ARRA. An important difference between the ARRA and the HMP is that the former was deficit financed at the federal level, whereas we have assumed that the HMP was paid for at the federal level through contemporaneous tax financing; assuming tax financing will tend to reduce the fiscal multiplier of a program. A larger fiscal multiplier (i.e., a lower cost-per-job estimate) would produce larger budgetary and economic effects for Michigan than we have estimated here.

Another limitation is that our model is necessarily stylized and omits some features. We will discuss three of these here to explain why we did not include them: labor supply effects, Medicaid "woodwork" effects, and potential changes in disability determinations.

We assume that Medicaid expansion has no effect on labor supply. In theory, Medicaid expansion could affect enrollees' willingness or ability to work, though the direction of this effect is theoretically ambiguous. The availability of Medicaid may lead some individuals to work less, either because they no longer have to work full-time to obtain employer-provided health benefits or because they want to reduce their earnings in order to meet the Medicaid income eligibility standard. Alternatively, some HMP enrollees may be able to seek employment or work longer hours. For parents, the ACA expansion caused the Medicaid income eligibility limit to increase from 64% of FPL to 138%. Thus, parents can now earn more and still maintain coverage. Studies of Medicaid changes for low-income childless adults prior to the Affordable Care Act (expansion of coverage in

25. These calculations are for the "instantaneous" jobs multiplier, in that they do not account for stimulus spending in previous years. Because they pertain to the federal stimulus spending, they are not affected by assumptions about the potential increase in costs from new state residents.

Wisconsin, and cuts in Tennessee) found a broad range of labor supply responses: reductions in work associated with expansion of coverage, and vice versa (Buchmueller, Ham, and Shore-Sheppard 2016; Dague, DeLeire, and Leininger 2017; Garthwaite, Gross, and Notowidigdo 2014). Research on the Oregon Health Insurance Experiment and the ACA Medicaid expansions finds no evidence of a labor supply response (Baicker et al. 2014; Gooptu et al. 2016; Kaestner et al. 2017). Accordingly, our estimates assume no labor supply response to the HMP.

Implementing the ACA Medicaid expansion could generate additional costs for states if doing so led to an increase in enrollment among individuals in other eligibility categories that are subject to a lower Federal Matching Assistance Percentage. We ignore the possibility of such "woodwork" or "welcome mat" effects. Note that for our purposes, the question is not whether people eligible for traditional Medicaid signed up for the program beginning in 2014—which might have occurred because of the ACA's individual mandate, for example, or because of additional publicity surrounding health insurance in general—but whether there were more such people than if the state had not expanded Medicaid. That is, what matters for our modeling is whether there is a *marginal* woodwork effect of the HMP. We are comfortable omitting such a possibility from our analysis for two reasons. First, an analysis using national data suggests similar woodwork effects in expansion and nonexpansion states (Frean, Gruber, and Sommers 2017). Second, traditional Medicaid enrollment in Michigan dropped following 2014, from a peak of nearly 2 million in 2010 to only 1.75 million in 2015 and 2016 (Jen and Koorstra 2015). This decline was undoubtedly due in part to the relatively strong economic recovery from the Great Recession in Michigan and does not rule out marginal woodwork effects entirely; the drop in traditional Medicaid might have been even larger in the absence of the HMP. Nonetheless, we see little or no evidence of marginal woodwork effects in Michigan.

Another possible effect that we have not incorporated into our estimates is a change in disability determinations in response to Medicaid expansion. In theory, Medicaid expansion could cause disability determinations to increase as people gain knowledge and experience with the social welfare system—or decrease, as they can now obtain Medicaid without having to qualify for disability. In practice, recent studies of Medicaid expansion and disability caseloads find either mixed and inconclusive results (Chatterji and Li 2017), insignificant positive effects of expansion on disability determinations (Anand et al. 2018), or very small, positive, significant effects (Schmidt, Shore-Sheppard, and Watson 2017). Thus, we think it is

unlikely that Medicaid expansion has had appreciable effects on the number of Michigan residents receiving disability payments.

Another important limitation of our study is that we are unable to estimate the increase in state costs associated with the increase in state population with nearly the same degree of rigor that we used to model the HMP's economic and revenue impacts. We have instead provided a likely range of potential effects on costs. Although that range is rather wide, even at the estimated upper end of the potential increase in costs, our fundamental result that the HMP produces a net fiscal benefit for the state is unchanged.

Finally, we note that our results are specific to Michigan's economy, labor force, and state tax system. As noted earlier, projections of the state budget impact of Medicaid expansion in a variety of different states have reached different conclusions about the bottom line. Comparable analyses in the remaining 14 states that have not expanded Medicaid for low-income adults may differ in their findings from what we find for Michigan. Texas and Florida, for example, have much larger numbers of uninsured adults than Michigan does, so they would receive proportionately larger increases in federal Medicaid funding. However, because they have no state income tax, state tax revenue generated from increased economic activity would probably be lower as a proportion of new federal funding.

Conclusion

Our analysis shows clear fiscal benefits for Michigan from Medicaid expansion under the Affordable Care Act. The state's savings from reduced spending on other health programs, such as community mental health, plus the increased revenue from provider taxes are enough to cover the state's share of program costs even in 2021, when the state must bear 10% of the cost. Additional net state tax revenue from macroeconomic feedback effects on the state's economy puts the expansion even more solidly in the black from the state's perspective, with the fiscal benefits to the state outweighing costs in every year through 2021.

To carry out a tractable analysis of the state's bottom line we narrowed the focus of our analysis in two key ways. First, we focused on the impact of Michigan's Medicaid expansion decision *on Michigan*. Our estimates considered the cost of Michigan's expansion for other states—who foot most of the bill for it—only insofar as their increased tax burden reduces the amount that residents of other states will spend on goods and services produced in Michigan. Second, we did not attempt to model the impact on

Michigan residents of other states' decisions to expand Medicaid; we considered only the impact of Michigan's expansion decision, holding other states' choices fixed. A national analysis that took into account the impact of expansion in all states would look very different from the aggregation of 50 analyses that each took the perspective of a single state.

Although the question of how Medicaid expansion affects the state's bottom line is of central interest to state policy makers weighing the expansion decision, it is certainly not the only outcome that matters. Other benefits of Michigan's expansion for Michigan residents include improved health and welfare for those gaining coverage and better financial health for Michigan's hospitals (Antonisse et al. 2018; Buchmueller et al. 2017; Blavin 2016; Davis, Gebremariam, and Ayanian 2016; Nikpay, Buchmueller, and Levy 2015; Shartzer, Long, and Anderson 2015; Sommers et al. 2015; Sommers, Gawande, and Baicker 2017; Tipirneni, Goold, and Ayanian 2018; Wherry and Miller 2016). Ideally, state policy decisions would take these important benefits into account, in addition to the net effect of Medicaid expansion on the state's budget.

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