The University of Michigan Research Seminar in Quantitative Economics
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An Economic and Fiscal Impact Assessment of the Transformational Brownfield Plan Submitted by Bedrock Management Services, LLC

Hudson's Block, Monroe Blocks, One Campus Martius Expansion, and Book Building and Book Tower Redevelopment Project

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Contents

About This Series

The Transformational Brownfield Plan Assessment Series is a joint effort by the University of Michigan Research Seminar in Quantitative Economics (RSQE) and the W.E. Upjohn Institute for Employment Research to analyze fiscal and economic effects of Transformational Brownfield Plans, or TBPs. Michigan defines TBPs as brownfield plans that have a transformational impact on local economic and community revitalization while also having an overall positive fiscal impact on the state. State law requires economic and fiscal impact analyses for TBPs that request rewards of at least $1.5 million. RSQE, in consultation with the Upjohn Institute, will produce up to 25 such analyses, five per year, for the Michigan Economic Development Corporation.

Executive Summary

This report presents an economic and fiscal impact analysis of the Transformational Brownfield Redevelopment Plan for the Hudson's Block, Monroe Blocks, One Campus Martius Expansion, and Book Building and Book Tower Redevelopment Projects proposed by Bedrock Management Services, LLC (the proposed TBP). The analysis was conducted by a team of researchers from the University of Michigan Research Seminar in Quantitative Economics (RSQE) and the W.E. Upjohn Institute for Employment Research (Upjohn Institute).

We estimate that the proposed TBP will produce a net fiscal benefit of $596 million to the state of Michigan on a net present value basis, measured in nominal dollars as of 2017. The estimated increase in state tax revenues generated by the proposed TBP through the end of our analysis period in 2052 is $2.5 billion, with a present value of $861 million. The total estimated cost of the tax incentives for the developer is $618 million, with a present value of $265 million. We estimate that the increase in state tax revenues generated by the proposed TBP will be larger than the cost of the tax incentives in each year of the analysis period. The ratio of the present value of the increase in projected tax revenues to the present value of the total tax incentives is estimated to be 3.2 to 1.

We project that the proposed TBP will generate 7,738 jobs directly at the TBP sites from 2024 to 2052, after the construction period of the project is complete and occupancy has stabilized. We estimate that the proposed TBP will create or support an annual average of 7,927 "net new" job additions statewide in that time. We further project that the proposed TBP will lead to an increase of nearly 16,500 new residents in Michigan by 2052, and an average increase in real statewide personal income of $706 million per year, in 2009 dollars, over the entire analysis period 2017 to 2052. The increase in real wage and salary income per net job addition averages $70,000 per year over that period, reflecting the high proportion of net job additions in white-collar industries.

We consider the assumptions in our baseline analysis to be conservative, but we also considered an adverse scenario with less favorable assumptions. In that scenario, the proposed TBP creates or supports an average of 5,902 net job additions statewide in the post-construction period. The estimated increase in state tax revenues generated by the proposed TBP through the end of our analysis period in 2052 is $1.7 billion, with a present value of $630 million. Because the cost of the tax incentives is unchanged in this scenario, the proposed TBP generates a net fiscal benefit to the state of $364 million in present value terms, and the benefit-cost ratio is estimated to be 2.4 to 1. Therefore, we conclude that the proposed TBP will produce a net fiscal benefit to the state of Michigan under a wide range of assumptions and economic circumstances.

Analytical Focus

This document provides estimates of the economic and fiscal impacts on the state of Michigan of the Transformational Brownfield Plan (TBP) for the Hudson's Block, Monroe Blocks, One Campus Martius Expansion, and Book Building and Book Tower Redevelopment Projects submitted by Bedrock Management Services, LLC to the Michigan Economic Development Corporation (MEDC).

The report was prepared by the University of Michigan Research Seminar in Quantitative Economics (RSQE), in consultation with the W.E. Upjohn Institute for Employment Research (the Upjohn Institute). RSQE is the third-party contractor with the MEDC for the economic and fiscal impact analysis required by statute for Transformational Brownfield Plans that request rewards greater than or equal to $1.5 million. RSQE and Upjohn received feedback on the analysis methodology from a panel of economic development experts. Short biographies of the report's authors and the expert panelists are included in Appendix I. Participation on the Expert Panel does not imply agreement with the analysis or responsibility for the estimates contained in the report.

This report does not contain the third party financial and underwriting analysis of the proposed TBP that is also statutorily required for Transformational Brownfield Plans that request rewards greater than or equal to $1.5 million. That analysis was conducted by a separate contractor, SB Friedman Development Advisors of Chicago (SB Friedman). Several assumptions have been harmonized between the two analyses. The harmonization of these assumptions also does not imply SB Friedman's agreement with the analysis or responsibility for the estimates contained in this report.

The conclusions in this report are the sole responsibility of the report's authors. While conducting the analysis, we have made substantial reliance on data and projections provided by the developer of the proposed TBP, Bedrock Management Services, LLC. We have attempted to verify the appropriateness of those key projections, but ultimately, we must rely on information provided by the developer regarding many key pieces of information to conduct the analysis. Material deviations of the actual development from the projections we have analyzed may cause the economic and fiscal impact on the state to be materially different than we project. Similarly, a materially different national or local business environment than we currently anticipate may also cause the economic and fiscal impact on the state to be materially different than we project.

Background of the Bedrock Transformational Brownfield Program

The proposed TBP that we assess in this report is the "Transformational Brownfield Plan for the Hudson's Block, Monroe Blocks, One Campus Martius Expansion, and Book Building and Book Tower Redevelopment Projects" prepared by Bedrock Management Services, LLC (Bedrock, or the developer).[1]

The plan includes projects at four distinct sites near each other in downtown Detroit.[2] These projects include:

- Restoration and renovation of the historic Book Tower and Building;

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[1] The official TBP document, Bedrock (2017), submitted to the City of Detroit is available here: http://www.degc.org/wp-content/uploads/Final-Bedrock-TBP-As-Submitted-10.12.17.pdf.
[2] The TBP legislation allows a single TBP to be composed of separate developments on multiple noncontiguous sites that together comprise a related program of investment.

- Redevelopment on the site of the former Hudson's Department Store, imploded in 1998, which is planned to be the tallest building in Detroit;
- Redevelopment on a collection of seven contiguous parcels referred to as the "Monroe Blocks," which currently consist of surface parking lots and several vacant structures, including the National Theatre building;
- An expansion of the office building at One Campus Martius.

The four sites collectively will include office, retail, hotel, residential, event/exhibition, and public space uses.

The TBP submitted by Bedrock calls for a total of $618,019,167 in captured tax revenues across the four projects based on its own estimates and projections.[3] That total consists of 37 percent from the capture of property taxes; 10 percent from construction period sales and use tax exemptions; 3 percent from the capture of construction period income tax; 41 percent from withholding tax capture revenues of future employees at the sites; and 8 percent from income tax capture from future residents at the sites.[4]

Bedrock estimates that the total investment costs across all projects will come to $2.15 billion, with over 80 percent of that total occurring at the Hudson's and Monroe Blocks sites. Therefore, Bedrock is projecting to offset approximately 29 percent of the investment costs with captured tax revenues, although the timing of the offsets will differ materially from the timing of the investments.

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[3] See Attachment F beginning on page 85 of the TBP document, Bedrock (2017), for this projection. As described in the section "Accounting for Economic Impacts of Tax Incentives" later in this document, we have harmonized the projected tax capture with SB Friedman's estimate of approximately $601 million. We use this lower figure in our analysis.

[4] The total tax capture also includes $1.6 million (0.3 percent of the total) from capture of local income tax from the City of Detroit permitted under the brownfields legislation.

Summary of Michigan's Transformational Brownfield Program

In the summer of 2017, Michigan Governor Rick Snyder signed legislation that established the Transformational Brownfield Plan (TBP) program in Michigan.[5] The purpose of the legislation was to provide a new economic tool to motivate developers and businesses to renovate, rehabilitate, and more generally *transform* existing brownfields into local hubs of economic development and community revitalization. The program is directed at larger projects that not only provide modernized workspaces but also raise the amenity value of a place, helping to make Michigan more attractive for both current and prospective residents of the state.[6] Under the program, developers with an approved TBP are able to capture a share of incremental tax revenue generated by the project for a specified period. We describe the program specifics briefly below. For a more detailed summary, see Michigan Economic Development Corporation (2017).

What is a brownfield?

A "brownfield" is typically defined as a property with either real or potential environmental contamination that restricts the property's future uses. Under the TBP program, the term brownfield is expanded to include blighted, functionally obsolete, historic, and transit-oriented properties, as well as undeveloped properties that have previously been identified as brownfield-eligible under the existing brownfield program.[7]

What is a Transformational Brownfield Plan?

A TBP is defined as a brownfield plan that "will have a transformational impact on local economic development and community revitalization based on the extent of brownfield redevelopment and growth in population, commercial activity, and employment that will result from the plan."[8] The development of the brownfield must be for a mixed-use project that involves some combination of residential, office, retail, and hotel uses, and satisfies a minimum threshold of capital investment that varies by the population of the community containing the brownfield site, as shown in Table 1.

Table 1: Minimum Capital Investments by Community Population

Community Population	Minimum Capital Investment
Greater than or equal to 600,000	$500,000,000
150,000 to 599,999	$100,000,000
100,000 to 149,000	$75,000,000
50,000 to 99,999	$50,000,000
25,000 to 49,999	$25,000,000
Less than 25,000	$15,000,000

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[5] The TBP legislation consists of Michigan Public Acts 46–50 of 2017, which collectively amend the existing Brownfield Redevelopment Financing Act (Act 381 of 1996).
[6] See State Fiscal Agency (2018) and MEDC (2017).
[7] MEDC (2017).
[8] Michigan Public Act 46 of 2017, MCL 125.2652 (vv).

Outline of Tax Incentives for Developers

A developer with an approved TBP can capture shares of specific incremental tax revenues that are generated by the project up to the amount specified by the TBP or for a defined number of years, whichever comes first. Incremental tax revenue is defined as the projected tax revenue generated by the site or sites of the proposed TBP minus the amount of tax revenue generated by the site(s) at the time that the TBP is adopted (i.e., before the project breaks ground). Before the TBP program was established, developers and localities could capture incremental *property* tax revenues, generally under the Brownfield Redevelopment Financing Act of 1996 (PA 381), for up to 30 years. That has not changed and remains one type of tax revenue that can be captured under an approved TBP. However, under Public Acts 46, 48, and 49 of 2017, the TBP program also allows developers to capture

- **Construction Period Income Tax Revenues**: 100% of the amount of state income tax levied and imposed in a calendar year upon wages paid to individuals physically present and working within the eligible property for the construction, renovation, or other improvement of eligible property that is an eligible activity within a transformational brownfield plan.
- **Construction Period Sales and Use Tax Exemptions**: Sales and use tax exemptions for all the purchase or acquisition of tangible personal property that will be affixed and made a structural part of the real property or infrastructure improvements included within the plan.
- **Income Tax Revenues**: 50% of the incremental income tax from individuals domiciled within the eligible property.
- **Withholding Tax Revenues**: 50% of incremental income tax withheld from individuals employed within the eligible property.

The captured revenues can be used to finance TBP eligible activities, which include "demolition, construction, restoration, alteration, renovation, or improvement of buildings or site improvements on eligible property, including infrastructure improvements that directly benefit eligible property" as well as activities typically associated with brownfield development, such as lead, asbestos, or mold abatement.[9]

There are some limits to revenue capture by the developer. First, the tax revenue available to be captured will be limited to an amount that is necessary to make the project economically viable. In other words, the project would not be able to proceed as planned without the tax capture. In addition, while property tax can be captured for up to 30 years, the construction, income, and withholding tax revenues can be captured for up to 20 years.

The legislation sets other limits on total revenue captures across all TBPs over the life of the program. Income and withholding tax capture revenue is limited to a total of $800 million across all projects, while construction period captures are limited to a total of $200 million. Furthermore, the program sets an annual limit of $40 million on nonconstruction income and withholding captures across all approved projects.

How is a TBP approved?

To approve a TBP, the developer must first receive approval from both the Brownfield Redevelopment Authority and the local unit of government where the project will be located. Next, the developer must

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[9] See Michigan Public Act 46 of 2017, MCL 125.2652 (o) for a complete definition of eligible activities.

receive approval from the Michigan Strategic Fund (MSF), the agency responsible for overseeing the state's economic development strategies. There are two key thresholds that must be satisfied to obtain MSF approval:

1. The TBP must be expected to result in an overall positive fiscal impact to the state net of tax capture. In other words, total state revenue collected because of the TBP, not including local taxes or other fees, must be expected to exceed the amount of tax captured by the developer.[10]
2. There must be a demonstrated gap in financing; that is, the TBP would not be executed as planned without the tax capture by the developer.

An additional requirement regards third-party analysis. For TBPs that propose to use more than $1.5 million in tax capture revenues, independent third-party analysis must be conducted on both key threshold questions above. In that case, the state treasurer must also agree with the conclusions of the third-party analysis before MSF can provide approval.

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[10] The legislation does not provide a specific definition of the overall fiscal impact to the state. For the purposes of this report, it is defined based on state net revenues and does not include local taxes and user fees. See the section "Definition of Net Fiscal Benefit" below for additional detail.

Methodology for Economic Impact Analysis

The Michigan Economic Development Corporation (MEDC) stipulated in its Request for Proposals to conduct the TBP Economic and Fiscal Impact analysis that the analysis must be conducted using the REMI PI+ model (REMI model) developed by Regional Economic Models, Inc., or REMI. A description of the model and associated documentation is available at: http://www.remi.com/model/pi/. The version of the model used for this analysis is the same version that the MEDC uses for its internal economic impact assessments; it contains 70 economic sectors and 83 geographical regions, one for each county in Michigan.

The economic impacts of a TBP will generally differ depending on its geographical location, reflecting different areas' industrial compositions and patterns of trade. To most accurately estimate those economic impacts, the model inputs are constructed and the model is run at the county level. The legislation establishing the TBP program, however, specifies that the relevant economic and fiscal impact for the evaluation of a TBP is at the state level. Therefore, the economic and fiscal impacts of the TBP have been aggregated to the state level for reporting purposes.

The economic impacts of a Transformational Brownfield Plan can typically be divided into several separate components. The analysis of this project is divided into four parts: (1) impacts from construction activity; (2) impacts from operations activity; (3) the amenity and migration impacts from the provision of new residential units; and (4) the economic effects of accounting for the cost of the tax incentives. Each is discussed below, after providing background related to the mechanics of the REMI model and the basis for the projections and assumptions underlying the impact assessment.

Background: Substitution, Multipliers, and Net New Economic Activity

Estimating a proposed TBP's net fiscal effect on the state of Michigan requires first estimating its impact on net new economic activity in Michigan. Net new economic activity is the increase in economic activity within the state of Michigan that would not have occurred without the development of the proposed TBP. It is conceptually distinct from the amount of economic activity that is projected to occur directly at the developed TBP sites, which is used for the calculation of the TBP developer's eligibility for tax incentives under the TBP legislation.

Quantifying the amount of net new economic activity in Michigan generated by a TBP requires accounting for two competing forces: substitution of economic activity and local economic multipliers. Economic substitution refers to the tendency of new economic development in an area to compete with and displace economic activity that already existed (or would have existed in the absence of the TBP) in the same geography. For instance, the opening of a retail store is likely to capture some sales that would otherwise have occurred at other stores nearby; it is therefore incorrect to treat all sales at the new store as net new economic activity in the area. Economic multipliers refer to the tendency of new economic activity to drive additional activity in the area. For instance, a new manufacturing plant will tend to purchase parts from the local area, creating jobs at local suppliers (jobs created at suppliers of a new project are often called indirect jobs). Additionally, the workers at the new plant will spend some of their new income on local goods and services, supporting additional employment in the area (jobs created by this increased spending in the broader economy are often called "induced jobs").

Economic substitution will tend to reduce the amount of net new economic activity within a geography generated by a TBP relative to the direct activity at the development site itself, but local economic

multipliers will generally increase the amount of net new activity. Therefore, the number of net new jobs in Michigan generated by a TBP can be either higher or lower than the number of direct jobs at the TBP sites. In contrast to the economic activity projected to occur at the proposed TBP sites, which the state can measure directly over time, the amount of net new economic activity generated by a TBP is not directly measurable and must be estimated using an economic model, even retrospectively. As noted, we have used the REMI PI+ model for the analysis, as stipulated in the MEDC's Request for Proposals.

Estimating Economic Substitution

The REMI model contains estimates of the share of new economic activity in an area that is expected to be exported or to reduce existing imports using data on gross trade flows between counties by industry. The gross trade flow estimates account for variance in trade between areas based upon the scale of supply and demand, distance, and industrial composition.[11] Only the share of new activity in an area that is expected to be exported or to reduce imports is counted as the net new portion of the direct economic activity generated by the TBP.

It is important to note that although REMI's trade flows are estimated at the county level, the trade equations account for economic substitution across counties as well (for instance, a new development in Wayne County, Michigan could displace some economic activity in Oakland County, Michigan or vice versa). For the purposes of this analysis, all results are aggregated to the state level, so that the focus is on net new activity to the state of Michigan as a whole, rather than for any single county or group of counties.

An example should help to clarify the trade flow estimation in the REMI model. In 2016, the REMI model estimates that Wayne County will *produce* $1.15 billion (2009 dollars) in manufactured food products and will *consume* $2.79 billion of food products. Because Wayne County has relatively little food manufacturing, the REMI model estimates that a relatively high share of local production will be consumed within the county ($0.59 billion, or 50.9 percent) and only 49.1 percent ($0.57 billion) of production will be exported. Ottawa County Michigan, on the other hand, is expected to produce more food than it consumes ($1.90 billion vs. $0.83 billion). Consequently, Ottawa County consumes $0.39 billion of its local production (20.4 percent) and exports the balance of its production ($1.52 billion, or 79.6 percent). Based on the trade flow equations, Ottawa County will send $18.3 million (2009 dollars) of manufactured food products to Wayne County. In contrast, Wayne County will only send $680,000 (2009 dollars) of manufactured food products to Ottawa. Wayne County ships much of its food product exports to Oakland County ($110.7 million) because Oakland County is relatively large, is geographically nearby, and, like Wayne County, has a high propensity to import food products.

The REMI model estimates that if a generic new firm entered Ottawa County and started producing $100 million in manufactured food products, 78.8 percent of the production would be exported. The share of new production used to reduce imports would be negligible; in fact, manufactured food imports overall would increase slightly because the increase in local income would outweigh the import

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[11] Technically, the REMI model uses estimated "gravity equations." The REMI trade flow equations are shown on pages 53 and 54 of http://www.remi.com/wp-content/uploads/2017/10/Model-Equations-v2_1.pdf, and the estimation procedure is explained in http://www.remi.com/wp-content/uploads/2017/10/Technical_documentation_for_Estimating_Betas_and_Sigmas.pdf.

substitution effect. If that firm had instead located in Wayne County, only 48.4 percent of the production would be exported, and 24.4 percent of the production would reduce imports. In that case, Ottawa County's manufactured food exports to Wayne would decline by $240,000.

The REMI model also incorporates the wide variation in the ease of exporting and importing different goods and services. Manufactured goods are relatively easy to trade between areas, whereas some services, such as retail trade, tend to be more difficult to trade. In the REMI model, the difficulty in trading retail trade services is reflected in a relatively high distance decay parameter governing trade between different areas, whereas food manufacturing has a relatively low distance decay parameter. Thus, retail trade activity in the REMI model primarily serves the local community.[12]

In some cases, it would be inappropriate to use the REMI model's default estimates of the share of economic activity that is net new. Those estimates are based on industry-wide averages and may not accurately reflect the specifics of the proposed TBP development. For instance, if a TBP developer proposes to add employees of a national firm that does the majority of its business outside of Michigan at the TBP sites, using the REMI average shares of activity that serve the local economy will be incorrect. In that case, it is possible to explicitly define the share of relevant direct employment at the project sites that is net new to Michigan.[13]

Estimating Local Economic Multipliers

The use of local economic multipliers, also known as input-output (I-O) multipliers, is well established in the regional economics literature. For instance, the Bureau of Economic Analysis (BEA) produces a set of regional I-O multipliers, known as the Regional Input-Output Modeling System or RIMS II, which are described as follows (Bureau of Economic Analysis, 2013, p. 1–2):

> *Regional I-O multipliers are based on a detailed set of industry accounts that measure the goods and services produced by each industry and the use of these goods and services by industries and final users. This detail allows for estimates of the impact of an initial change in economic activity on industries in a region. I-O models do not account for price changes that may result from increased competition for scarce resources.*

The fact that the I-O multipliers in RIMS II do not account for price changes that may result from increased competition for scarce resources is equivalent to the assumption that factor supply is perfectly elastic across areas. In particular, this assumption implies that the supply of labor is unlimited at current market wages. Such assumptions are much more likely to be accurate in the long run than in the short run. Therefore, these multipliers are most appropriate for studying the long-run impact of an economic change, omitting an explicit time dimension.[14]

Local economic multipliers in the REMI model are based on a similar set of industry I-O tables, but the REMI model relaxes many of the assumptions imposed in the RIMS-II model. The REMI model also does not assume that factor supply, particularly labor supply, is perfectly elastic in the short run. Instead, in the REMI model, an increase in demand for labor generates an equilibrating response in local wages,

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[12] The expansion of e-commerce has facilitated trade between different geographic areas. Tourism and cross-county shopping also generate retail trade "export" sales.

[13] Using the REMI model's standard assumptions about the share of activity that is net new is done with the model's "firm policy variables." Treating activity as net new is called entering the activity "exogenously."

[14] Another widely used economic impact model, the IMPLAN model, also does not include a time dimension.

prices, and population migration to ensure "closure" of the local labor market. The REMI model's inclusion of an explicit time dimension makes it well suited to studying projects for which the timing of benefits and costs is potentially important.

To illustrate the concept of economic multipliers, we continue with the example from the section on economic substitution: a new generic food manufacturing firm begins operations in Wayne County in 2016, employing one hundred workers. The REMI model estimates that nine of those jobs would simply replace activity at other food manufacturers in Wayne County, so that this activity would generate ninety-one net new jobs in the food manufacturing industry in Wayne County. Total employment in Wayne County is estimated to increase by 169 jobs, however, including four jobs in state and local government and seventy-four jobs in the private sector outside of food manufacturing.[15] These seventy-four jobs include both intermediate goods and services activity (suppliers, or indirect jobs), and activity generated by the spending out of the incomes arising from the new direct and indirect economic activity (induced jobs). For instance, they include six jobs in wholesale trade and four jobs in trucking (mostly intermediate supplier activity), and seven jobs in retail trade and four jobs in restaurants and bars (income-induced activity). They also include nine jobs in construction, due partly to the increased need for facilities to house the new economic activity. Therefore, a generic food manufacturing company in Wayne County would have a county-wide jobs multiplier of 1.69, or 169 total new jobs divided by 100 direct jobs.

Statewide, total employment in the food manufacturing industry would increase by eighty-four jobs, fewer than would be gained in Wayne County alone. This is because of the greater scope for economic displacement at the state level versus the county level: Some food manufacturers elsewhere in Michigan would lose sales to the new food manufacturing firm in Wayne County.

Nonetheless, the new food manufacturing activity would generate a total of 226 jobs statewide. The overall impact on net new activity is larger statewide than at the county level, despite the smaller direct impact, because the increased economic activity in Wayne County stimulates job creation elsewhere in the state. For example, statewide the number of jobs in wholesale trade increases by nine, in trucking by five, in retail trade by sixteen, and in restaurants and bars by seven, all significantly higher than the number of jobs created in Wayne County alone. Thus, on a statewide basis, a generic food manufacturing company in Wayne County would have a jobs multiplier of 2.26, or 226 total new jobs statewide divided by 100 direct jobs.

If the new firm in the example had definite plans to export all or nearly all its product outside of the state of Michigan, then the new firm would create 100 net new food manufacturing export jobs in Wayne County (and in the state overall) in 2016. The key characteristic of such an export firm is that it does not significantly displace any current or future sales of existing local firms. In Wayne County, such a new food manufacturing export firm would generate a total of 194 jobs, for a local employment multiplier of 1.94 (194 divided by 100). Statewide, this new firm would create 283 jobs for a state-to-county jobs multiplier of 2.83 (283 divided by 100).

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[15] These job estimates apply only to 2016. The number of net new job additions will change over time as the model's equilibrating properties come to bear. Also note that the REMI model's input-output matrix, as is standard in the field, does not include the farm sector. Thus, these estimates do not include any count of net new jobs created in farming due to an expansion of food manufacturing.

Although the local multipliers for food manufacturing are well above one, for some industries the local multiplier will be below one. For instance, if a new generic local restaurant were to open with 100 employees in Wayne County, then the REMI model estimates that this restaurant would create only thirty-five net new jobs in in the county, including twenty-nine net new jobs in the restaurant industry. Most of the activity (71 percent) at this restaurant would simply displace sales at other restaurants in Wayne County. Consequently, the county jobs multiplier at this generic restaurant is only 0.35 (35 divided by 100). The number of net new jobs created statewide is even lower because the new restaurant displaces jobs in restaurants in other counties in the state as well as in Wayne County. The REMI model estimates that the one hundred direct employees at the new restaurant will produce only nine net new restaurant jobs in the state of Michigan. That net new restaurant activity will support a total of six additional indirect and induced jobs in Michigan, so that the total net increase in employment in the state is fifteen, for an employment multiplier of 0.15 (15 divided by 100).

Basis for Assumptions and Projections

Modelling the TBP economic impacts entails making several decisions regarding the modelling approach and assumptions regarding relevant quantities. Our general approach to forming these projections was to attempt to validate the projections provided by the developer independently or with the assistance of SB Friedman, if practical.[16] Because the developer has the most detailed knowledge regarding its plans for the proposed TBP, the developer's projections were used if we determined them to be reasonable or conservative. If the developer did not provide a projection for a particular input, or if we determined the developer's projection to be aggressive, we used our own best projection of the input values.

One exception concerns the distribution of total project costs between hard costs, soft costs, and developer fees, as well as the breakdown of hard costs to the different end uses (residential, office, retail, events, exhibition, hotel, and parking). SB Friedman made small changes to the cost breakdowns based on additional information received from the developer. The total development cost did not change for any of the sites, only the distribution to the different cost categories. We used SB Friedman's revised cost estimates in our analysis.

SB Friedman also analyzed a scenario using alternative assumptions with lower total development costs and incentives. We have analyzed that scenario and found that the project would also provide a net fiscal benefit to the state using those assumptions. Additional information regarding that analysis is available at the request of the MEDC.

Our assumptions are described in more detail in the following sections.

Construction Impacts

The construction of a new brownfield redevelopment property inevitably has a substantial construction component. This activity will usually involve five sets of inputs into the REMI model: a) soft construction costs, b) hard construction costs, c) tenant improvements, d) producer durables purchases by tenants, and e) increases in the value of the capital stock. The soft and hard construction activity occurs during the initial phase of the project, while tenant improvements and producer durables purchases occur both

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[16] There were some input projections that did not have a substantial impact on the analysis and were difficult to validate independently. In those cases, we accepted the developer's projections.

at the end of the construction phase and in subsequent years due to the need to "refresh" those goods and services.

Soft Construction Costs

The Bedrock TBP application provides data on total expected soft and hard construction costs for each site over time, and then breaks out the total costs, across all construction years, into subcomponents such as "Architecture & Design" in soft costs or "Hotel FF&E" in hard costs. These data allow soft and hard costs to be divided into different industries and entered into the REMI model separately.

One difficulty is that the input-output portion of the REMI model allocates a portion of hard cost construction inputs to soft costs. We have separate data on the expected soft costs, which we enter in addition to the expected hard costs. Therefore, to ensure that the full amount of hard and soft cost spending is accurately allocated in the model, we allocate part of the soft cost expenditure to the hard cost policy variables in REMI. An additional complexity involves the timing of this expenditure. Much soft cost expenditure occurs prior to the physical construction of the buildings. With agreement from the Expert Panel, we directly entered one-half of the soft costs in the first year of construction activity at each site into the REMI model. The soft costs were divided between professional and technical services, insurance, and real estate services using the REMI model's "demand" variables to allow for the possibility that some of the soft costs services would be provided by firms located outside of Wayne County. The other half of the soft costs were added to the hard cost construction variables in proportion to hard cost spending by industry beginning in the second year of construction.

We harmonized our assumptions regarding soft cost construction spending with the revised estimates produced by SB Friedman described above. Those assumptions are reported in the financial underwriting report on the proposed TBP.

Hard Construction Costs

Given the structure of hard and soft cost data described above, we allocate hard construction spending by industry to specific years in proportion to total expected hard cost expenditures over time. This spending is entered in the REMI model using the detailed industry sales variables for multifamily residential construction, highways and streets construction (for parking garages), commercial structure construction, and other nonresidential structure construction.

As we did with the soft cost construction spending, we harmonized our hard cost construction spending projections with SB Friedman's revised estimates.

Tenant Improvements

Nonresidential

Following the initial construction period, tenant improvements are introduced into the REMI model using the nonresidential maintenance and repair detailed construction variable. The initial tenant improvements are included as hard costs in the data provided by the developer and are therefore entered with the hard cost construction activity above. Based upon consultations with private sector property developers with no involvement in the proposed TBP, the refresh rates for tenant improvements are introduced starting in the sixth year of operations activity, at a rate equal to 20 percent per year of the initial real dollar value of tenant improvements provided by the developer.

Residential

Based upon our consultations with private sector property developers, we determined that the refresh rate for the residential property development should be 5 percent of the residential rent payments annually. We introduced this value into the REMI model using the residential maintenance and repair detailed construction variable. Residential refresh spending was assumed to start in the first year of occupancy and continue every year. Annual rent projections were provided by Bedrock for each of the sites and assume an annual increase of 3 percent.

Producer Durables

Producer durable purchases are introduced into the REMI model using the computer, communications, and furniture detailed equipment investment variables. The developer provided information on the expected personal property expenditures over time in relation to its estimates of the personal property tax capture. That information mapped directly into the producer durables categories in the REMI model. The developer also provided estimates of the timing of the refresh expenditures.

Based on our consultations with private property developers, we judged the timing and magnitude of the refresh expenditures to be reasonable or slightly conservative. Therefore, we used Bedrock's estimates in our baseline projections. The dollar value of producer durable spending was introduced into the model using 2016 real dollar values.

Capital Stock

The total value of nonresidential and residential construction activity was added to the actual nonresidential and residential capital stocks in the project county in the final year of the construction component of the project. The REMI model endogenously reduces construction activity in future years to account for the projects' fulfillment of capital demand in the area. In practice, therefore, not all the new construction will be treated as net new in the analysis.

Operations Impacts

The operations phase of the analysis incorporates the benefits from the commercial activity at the site after construction is complete.[17] A portion of the commercial activity at the new brownfield project will substitute for activity already performed elsewhere in the county or state. The portion of economic activity associated with the brownfield project that is net new to Michigan is the share that will either be exported or that will replace existing imports. This portion is determined endogenously within the REMI model, except where noted explicitly below.

Employment Impacts

The first task in estimating the operational benefits of a brownfield redevelopment project is to estimate total employment at the site by industry. The operational activities of brownfield projects tend to involve five major industries: 1) retail trade; 2) hotels; 3) restaurants; 4) events and conferences; and 5) office sector or "white collar" employment. The developer provided us with estimates of employment in each of these five categories for all four sites, based on the planned rentable square footage at each site and assumptions about the square footage per employee by industry. These estimates, along with the developer's expectations for average wages, are shown in Table 2.

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[17] The benefits from the residential activity will be captured in the amenity effects portion of the economic impact analysis, described in the following section.

Bedrock also provided us with data on estimated occupancy rates for each industry and site over time. For example, the office space is expected to have a long-run occupancy rate of 90 percent at all sites. We applied these occupancy rates to the full-occupancy employment estimates to generate annual expected employment at each site as shown in the third row of Table *2*.

Table 2: Employment Assumptions Provided by Bedrock

	Soft Retail	Hotel	Food & Beverage	Events & Exhibitions	Office
Square Footage per Employee	164	350	157–158	500–4,199	175–200
Total Employees at Full Occupancy	807	204	816	198	6,396
Total Employees with Long-Run Occupancy Assumptions	790	204	789	198	5,757
Average Salary (2018$)	$25,522	$23,733	$23,733–$24,523	$40,000–$68,393	$85,000

The developer's projections for employment levels in the retail trade and restaurant industries were benchmarked using data from Avention, a provider of commercial property data and analytics that is now owned by Dun and Bradstreet. The average number of rentable square feet per employee in the retail and food and beverage industries was calculated for all tenants in the data set in the downtown Detroit market.[18] We calculated averages of 221 square feet of rentable space per employee in the Soft Retail sector and 243 square feet per employee in the Food and Beverage sector, somewhat higher than in the developer's projections. The sample sizes for the relevant markets are limited, however, and the spaces in the sample will be in older buildings that may differ substantially in functionality and layout from the proposed developments.

To address this difference, we performed a sensitivity analysis comparing the results of the fiscal impact analysis using the average employees per square foot of rentable space in the Soft Retail and Food and Beverage sectors from the Avention data with the averages in the developer's projections. The results were within 0.1 percent of the baseline estimates on a net present value basis, reflecting the high degree of within-state substitution and relatively low multipliers in these sectors. Because these assumptions did not materially affect the results of the analysis, we used the developer's projections in our baseline analysis.

Because of the unusual nature of the Events and Exhibitions and Hotel portions of the proposed developments, we were unable to validate the employment assumptions in those sectors independently. To assess the sensitivity of our results to the projected employment levels in those

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[18] We classified beauty shops, family clothing stores, florists, greeting cards, men and boys' clothing stores, miscellaneous home furnishings stores, miscellaneous retail stores, miscellaneous food stores, ophthalmic goods, paint, glass, and wallpaper stores, photocopying services, and sporting goods and bicycle shops in the Soft Retail sector for these calculations. We classified drinking places and eating places in the Food and Beverage sector.

sectors, we performed a sensitivity analysis in which we set employment in both industries to zero. As in the sensitivity analysis for the Soft Retail and Food and Beverage sectors, the overall results of the fiscal impact assessment changed by a negligible amount relative to the baseline. Therefore, we accepted the developer's projections of employment in these two sectors.

The first four industry categories in Table 2 line up well with the industries in the REMI model, allowing us to use the corresponding REMI "firm" employment variables.[19] In contrast, the Office Industry sector encompasses six major NAICS industries: Information (two-digit NAICS code 51); Finance and Insurance (52); Real Estate and Related (53); Professional and Technical Services (54); Management of Companies (55); and Business Support Services (three-digit NAICS code 561). In our version of the REMI model, these six industries are disaggregated into thirteen industries that include the "firm" variable option.

Because the exact distribution of office activity will not be known until the developments are complete and tenants have moved in, we had to make additional assumptions about how to allocate the office employment to the thirteen REMI industries. To do so, we used Dun and Bradstreet employment data by business establishment to estimate the preexisting distribution of office employment for the local market. For the proposed TBP, we used the Detroit Central Business District as our definition of the local market. The estimated shares of employment in the thirteen "Office" sectors are presented in Table 3.

Table 3: Distribution of Office Activity by Sector in the Detroit Central Business District

Sector	Share of Employment
Publishing industries, except Internet	14.1%
Motion picture and sound recording industries	1.0%
Internet publishing, broadcasting; ISPs, search portals; data processing; Other information	0.5%
Broadcasting, except Internet	0.9%
Telecommunications	9.6%
Monetary authorities; Credit intermediation and related activities; Funds, trusts	9.1%
Securities, commodity contracts, investments	1.4%
Insurance carriers and related activities	10.5%
Professional, scientific, and technical services	38.2%
Management of companies and enterprises	0.2%
Administrative and support services	10.4%
Real estate and related	4.1%
Rental and leasing services; Lessors of nonfinancial intangible assets	0.0%

We modified this distribution slightly based on specific information provided by the developer related to the expansion plans of the Quicken Loans Family of Companies (Family of Companies) at the proposed TBP sites.[20] Overall, the companies require 400,000 square feet of new office space by 2023.[21] In

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[19] We assign event and exhibition operations to the real estate industry in the REMI model.

[20] The Quicken Loans Family of Companies comprises several entities including Quicken Loans, the nation's largest mortgage lender, and Bedrock Detroit, a real-estate firm focusing on Detroit. See https://www.quickenloans.com/about/partner-company for more detail.

[21] Bedrock expects this expansion to increase to a total of 600,000 square feet of new office space by 2026. We did not incorporate the need for this additional 200,000 square feet in our analysis for two primary reasons. First, Bedrock may develop additional space in the area by that time, including as part of the River East project. Second,

addition, Bedrock provided us with a distribution of office space by the NAICS codes referenced above. We modified the Dun and Bradstreet employment distribution to reflect the Family of Companies distribution for the appropriate proportion of the rentable office space.

Bedrock projects 13 percent of the jobs in the space that it occupies in the proposed TBP sites to fall under NAICS code 55, Management of Companies. Given the nature of the Family of Companies business, we expect these jobs to generate economic activity that is almost entirely exported to other states. Therefore, the REMI model's default assumptions regarding the displacement of other activity in this sector in the state of Michigan are likely to be incorrect. To account for this difference, we enter the projected employment in this sector at the Family of Companies as exogenous in the REMI model.[22]

In principle, a similar argument may apply to the developer's projections of employment at the proposed TBP sites for NAICS codes 522292, 522390, and 522291, Mortgage Companies, Mortgage Servicing, and Consumer Lending, respectively. The REMI model's default estimates for the share of within-state displacement in these industries is based on industry averages that include many small companies with a primarily local footprint. In contrast, the Family of Companies, in particular Quicken Loans, has a national footprint and might reasonably be expected to have a stronger export orientation outside of the state of Michigan than is standard in these industries. Ultimately, we chose not to enter the projected employment at the Family of Companies in these industries as exogenous due to a desire to produce a conservative analysis. Some concerns we had about treating those direct jobs as exogenous included the treatment of indirect jobs that support these industries, whether some of those jobs would be located in the city of Detroit even in the absence of the proposed TBP, and whether some of those jobs may ultimately be located at sites outside of the proposed TBP.

We discussed the treatment of the projected employment growth at the Family of Companies in the REMI model at length with the Expert Panel, which supported our judgment to enter the majority of that employment using the firm policy variables. We consider this treatment to be conservative, and note that treating a higher proportion of that employment as exogenous would lead to larger estimates of the proposed TBP's economic and fiscal impacts on the state of Michigan.

To validate the developer's projected employment levels of 175 to 200 square feet of office space per employee in the Office industries, we relied primarily on industry sources that report estimated typical square footage of space per employee. For example, CBRE (2016) estimates an average of 171 square feet of office space per employee in North America. For Detroit, that estimate is 117 square feet per employee, which would imply substantially denser employment than the developer projects. We also compared the developer's projected employment density to the average density currently in the downtown Detroit market using the Avention data.[23] The average employment density in the Avention

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based on the occupancy assumptions we received from Bedrock, mechanically increasing the Family of Companies share of total square footage from 400,000 to 600,000 between 2023 and 2026 would require evicting non-Bedrock tenants, which we judged Bedrock to be unlikely to do.

[22] Because the REMI model's default assumptions involve a relatively low level of within-state substitution in this industry, relaxing this assumption to enter all jobs as "firm-level" jobs does not have a large effect on our main results.

[23] We classified accounting and bookkeeping, advertising agencies, advertising N.E.C. (not elsewhere classified), architectural services, attorneys, commercial banks N.E.C., federal savings banks, national commercial banks, state commercial banks, business associations, business services N.E.C., construction management, state credit unions,

data was 239 square feet per employee, which would imply less dense employment than the developer projects. It is unclear, however, how comparable the current stock of Detroit office space is to the proposed developments given the scarcity of development in the downtown market recently. Finally, the developer provided documentation indicating that the Family of Companies currently has approximately 136 square feet of office space per employee in Detroit, denser than the projections for the proposed TBP sites. Based on our review of the available evidence, we concluded that the developer's projections for employment levels in the office space at the proposed TBP sites were reasonable or slightly conservative, and accepted them in our baseline estimates.

Wage Levels

The next task in estimating the operational benefits from a brownfield redevelopment is to adjust the default wage rates in the REMI model to be consistent with the total wage bill generated by the jobs located directly at the TBP site. The wage data built into the REMI model are based on employment data from the Bureau of Economic Analysis, which includes the self-employed. The inclusion of the self-employed tends to lower the wage bill relative to the total compensation that we would expect to be earned by establishment workers at the brownfield redevelopment sites.

The developer provided estimates of average wages for each of the five industry groups based on the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW). As expected, these estimates generally exceed the REMI model's default wage rates. We performed our own calculations of average wage rates using the QCEW data and the employment distributions described above. We concluded that the developer's projections were reasonable and accepted them in our baseline analysis.

The developer also provided projections of 2 percent annual nominal wage increases throughout the analysis period. Those increases are substantially lower than is assumed in the REMI baseline forecast, and allow for zero real wage growth, assuming an average inflation rate of 2 percent per year. To be conservative in our analysis, we used the lower rate of wage growth projected by the developer in our baseline analysis. Projecting faster wage growth would tend to increase the project's economic impact on the state, although faster wage growth could also accelerate some portions of the developer's tax capture.

Avoiding Double Counting of Investment

The REMI model endogenously incorporates investment in construction and producer durables when direct employment changes are introduced into the model. In our analysis of the proposed TBP, however, we directly introduce construction activity into the simulation. Consequently, to avoid double counting the construction effects, we must neutralize the REMI-estimated construction and producer-durables spending generated by the employment inputs.

For the "firm" versions of the REMI policy variables, only a portion of the introduced employment changes are new exogenous employment resulting from increased exports or import substitution. Therefore, we only neutralize the portion of the "firm" employment changes that is exported or substitutes for existing imports. In contrast, 100 percent of the exogenous business management

commercial graphic design, bank holding companies, insurance agents, medical services plans insurance, surety insurance, investment advice, investment offices N.E.C., real estate investment trusts, investors N.E.C., management consulting services, mortgage bankers, professional organizations, public relations services, security brokers, and title companies in the Office sector for these calculations.

employment associated with the Family of Companies is assumed to be exported. Therefore, 100 percent of the construction and producer durables activity associated with the additional employment in that sector must also be neutralized.

Tourism Impacts

The developer envisions the proposed TBP sites, particularly the Hudson's site, generating substantial tourist activity. To be net new activity in the state of Michigan, tourist activity must come from out-of-state visitors or in-state residents who replace out-of-state trips with visits to the proposed TBP sites. We estimate tourist activity from overnight visitors and from day-trip visitors to the site separately: the number of overnight visitors were estimated as part of the Book Hotel development analysis, while the number of day trip visitors was estimated as part of the Hudson site analysis. We took information on average spending by the two types of visitors from Longwoods International (2016).[24] Our estimate of the number of new overnight trips is based upon the REMI model's estimate that one-third of new activity in the hotel industry will be net new to the state. The developer estimates that when the hotel reaches stabilized occupancy in 2023, it will generate 51,100 room nights per year, which we estimate will include approximately 17,000 net new room nights statewide. We estimate that each of these net new room nights will generate $107.30 (in 2016 dollars) of spending on restaurants, retail, recreation, and transportation in Detroit.[25]

We estimate the number of day-trip visitors by building on information provided by the developer. Although the developer projects that the proposed Hudson's site will draw 3 million annual visitors, we judge an estimate of 1.7 million annual visitors to be more realistic.[26] Of these visitors, we use the developer's estimate that 10 percent will be from out of state, and of those, 35 percent will be drawn by the Hudson's site itself.[27] These calculations give an estimate of 59,500 day-trip visitors per year from outside of Michigan who travel primarily to visit the Hudson's site. Each of these net new day-trip visitors is estimated to spend $64 on restaurants, retail, recreation and transportation in Detroit. These impacts are entered into the REMI model using the exogenous production policy variables for retail trade, transit and ground passenger transportation, performing arts and spectator sports, and food services and drinking places.

We consider our estimates of the net new tourism activity in the state of Michigan generated by the proposed TBP to be conservative, particularly the projected number of out-of-state visitors to the

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[24] We consider these spending estimates to be conservative, because they come from a statewide estimate for all travelers. Out-of-state visitors to these developments, especially overnight visitors, are likely to spend more than those average amounts.

[25] We account for the economic benefits from the spending on hotel accommodations in the direct operations estimates.

[26] This matches the annual number of visitors to Skydeck Chicago (http://theskydeck.com/the-tower/facts-about-the-ledge/). In contrast, the CN Tower in Toronto receives 2 million annual visitors (https://en.wikipedia.org/wiki/Tourism_in_Toronto), the Empire State Building receives 3.5 million visitors annually (http://www.nyctrip.com/pages/Index.aspx?PageID=1176), and the Eiffel Tower gets approximately 7 million annual visitors (http://www.chicagobusiness.com/article/20131207/ISSUE01/312079986/hancock-center-considers-new-way-to-look-down). Because a relatively small fraction of the total visitors to the Hudson's site are projected to be net new to the state of Michigan, this projection does not have a significant impact on the overall results.

[27] We do not treat tourists in Michigan who visit the Hudson's site, but whose trip to the state was not prompted by their visit to the Hudson's site, as net new for this analysis.

Hudson's Block site and the projected spending per day trip and overnight visit to the proposed sites. It is worth noting, however, that excluding these impacts from the analysis entirely has only a small effect on the overall results. The projected tourism impacts do not affect the conclusions of our analysis.

Amenity and Migration Impacts from Residential Construction

One of the key benefits of a brownfield redevelopment project is that it should remove a negative externality from the local community and replace it with a positive externality. The REMI model itself provides no guidance or structure regarding the magnitude of such effects, which will depend on the characteristics of each specific project. To quantify the relevant amenity effects, we conducted a thorough literature search of studies that have examined brownfield redevelopment projects. Appendix II presents a table listing the studies that we reviewed and that also reported enough detail for us to quantify the magnitude of the externality appropriately.

The economic literature has tended to estimate the value of the change in the externality effect from brownfield redevelopment using hedonic property value analysis. The studies we reviewed found a wide range in the estimated change in property values resulting from brownfield redevelopments. The aggregate effects on local property values ranged from 0.1 times the investment in the brownfield redevelopment project itself to over five times the value of the development. In our judgment, the most comparable study to the current project was Simons, Quercia, and Maric (1998), which considered new residential development in Cleveland, Ohio. We calculated, based on the results reported in the study, that the new development generated an aggregate increase in local property values of 0.9 times the value of the initial investment.

We did not assume any externality benefits from office, retail, hotel, parking, or restaurant activity associated with these development projects. There is limited evidence regarding the externalities these activities will have on the local community. Some evidence suggests that retail activity can have negative impacts on surrounding communities (Colwell, Gujral, & Coley, 1985) or has a negative initial effect but a positive longer-term effect (Wiley, 2015). This evidence does not necessarily apply to the types of retail in the proposed TBP, however. The development of office space appears to have no effect on surrounding residential property values (Wiley, 2015). One would expect that restaurants, especially upscale restaurants, would have a positive effect on neighborhood property values (Brooker, 2015), but the academic research on this topic was too thin to support such a conclusion with confidence.

Our assessment is that the literature cannot currently support the assumption of either positive or negative externalities from these activities in a reliably quantifiable manner. At our request, the Expert Panel considered this issue carefully in its review of our proposed analytical methodology. The Expert Panel supported our assessment.

We did not enter the residents living in the newly constructed residential units directly through a policy variable in the REMI model. Rather, the increase in population comes about endogenously in the model as a response to the increase in employment and amenity levels associated with the redevelopment process. We did, however, adjust the default assumptions in the REMI model to reflect the expected higher-than-average incomes of the net new residents at the proposed sites. We describe this adjustment in the following section.

Accounting for the High Expected Incomes of Net New Residents at the Proposed Sites

The REMI model assumes that new residents to Michigan, including those attracted by the new housing amenity benefit described above, will have incomes equal to the state average. The new residential housing units that are part of this development, however, are much more expensive than the average residential property in Michigan. Therefore, it is reasonable to expect that the residents of these properties will have higher-than-average incomes.

To quantify this impact, we first calculate the share of residents in the proposed developments who are net new to the state of Michigan. We use data from the Internal Revenue Service (IRS) Statistics of Income Migration data (Internal Revenue Service, 2017) to estimate that 1.46 percent of the Wayne County population in 2016 had moved from out of state in 2015, and that 1.67 percent of the Wayne County population in 2015 moved out of state in 2016. We divide the total of these gross migration flows, 3.1 percent, by the Census Bureau's estimate that 11.1 percent of the U.S. population moved residence in 2016 (Ihrke, 2017) to estimate that 28.2 percent of the residents of proposed developments will either come from out of state, or people who would have relocated outside of the state in the absence of the developments.

The dollar value of the projected income adjustments for the net new residents varies by proposed site along with the anticipated income of the residents and the number of new housing units in each project. For each residential development, the value of the adjustment equals the number of new units, times the estimated share of residents who are net new to the state, times the difference between the average projected income of the residents and the average household income in the state.[28]

We believe this adjustment is reasonable given the details of the proposed developments. As with some other assumptions that are difficult to project with confidence, however, we have performed the analysis without this adjustment as a sensitivity analysis. Removing this adjustment does not materially change our baseline estimates and does not affect our overall conclusion.

Accounting for Economic Impacts of Tax Incentives

The REMI model endogenously generates an increase in state and local government activity when private sector economic activity expands. If that expansion of private sector activity is encouraged by tax incentives, as in the brownfield redevelopment projects we are analyzing, then the REMI model's baseline estimates will tend to overstate the increase in government activity associated with the increase in private activity. In other words, because the REMI model does not endogenously enforce budget closure, analysts must manually account for the effects of any tax incentives in the model. Therefore, we reduced the REMI model's estimated increase in government spending resulting from the increase in economic activity by the cost of the incentive package.

We introduced this adjustment into the REMI model at the state government level using the estimated $618 million in tax capture.[29] The incentive cost borne by state government must be distributed across

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[28] The average household income statewide was $72,581 in 2016 and grows over time in our projections. We use the vacancy assumptions provided by the developer to determine the number of occupied units in a given year for each site.

[29] Although the proposed TBP plans to capture a portion of local property tax payments, these losses to the local units of government are expected to be reimbursed by the state. Thus, the state government bears the full burden of the incentives in our analysis.

all counties in the state. We distributed the cost to state government based on the distribution of state government employment by county. The reduction in state government spending is relatively small in most counties, and is largest in counties with a major state government presence, including public universities.

Adverse Scenario

We believe our baseline analysis, described above, represents a conservative analysis of the proposed TBP's economic impacts on the state of Michigan. To assess the robustness of our conclusions to a wide range of assumptions and future economic conditions, however, we have also performed the analysis using a more adverse set of assumptions, which we call the adverse scenario. This scenario allows for the possibility that demand for office space or workers in white collar occupations in the southeast Michigan region will be weaker than we project, or that some of the impacts we project from the proposed TBP might not materialize.

The adverse scenario assumes that the construction phase will proceed as expected under the baseline analysis, but we adjust the assumptions regarding the operational phase of the project in the following ways:

- Office vacancy rates increase by 10 percentage points across all sites in all operational years.
- All employment is entered using the "firm" policy variables (i.e., none of the projected employment growth at the Family of Companies is considered exogenous).
- We exclude the amenity effect associated with the residential development of the brownfield (i.e., the brownfield externality).
- We do not make any adjustment for the higher-than-average expected income levels of the net new residents at the development sites.

Our adjustment of the office vacancy rates is based on previous analysis by Grimes and Fulton (2017) for the Southeast Michigan Council of Governments (SEMCOG). That analysis considers a scenario in which the share of employment in the finance and insurance industry for the SEMCOG region increases from 4.5 percent in 2015 to 5.8 percent in 2025, matching the industry's share for the Pittsburgh Metropolitan Area in 2015. If occupied office space increases at the same rate as employment in office-related industries under this scenario, then we would expect total occupied office space to increase by roughly 500,000 square feet by 2025.[30] That total is approximately 10 percent of the planned Class A office space expansion between 2018 and 2025 in the southeast Michigan regional market according to supply projections from CoStar, a commercial real estate data and analytics provider.

For our adverse scenario, we consider a shock to the demand for office space in the SEMCOG region that is opposite the shock implied by our optimistic scenario. Therefore, we increase the projected office vacancy rate by 10 percentage points relative to our baseline scenario.

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[30] This calculation is relative to a baseline that we adjusted to reflect the current forecast for statewide employment growth for the years 2018 to 2020 in the Information, Financial Activities, and Professional and Business Services sectors, as represented in the RSQE forecast prepared for the State of Michigan's Consensus Revenue Estimating Conference held in Lansing, MI on January 11, 2018. Handout available at: http://www.house.mi.gov/hfa/PDF/Revenue_Forecast/CREC_RSQE_Presentation_Slides_Jan18.pdf

Methodology for Fiscal Impact Analysis

Definition of Net Fiscal Benefit

The TBP program guidelines specify that the Michigan Strategic Fund may not approve any TBP plan unless it determines that the plan will result in an overall positive fiscal impact to the state. Approval of TBPs that propose to use above a certain threshold of tax capture revenues require that the state treasurer concurs with the third party fiscal and economic analysis determination, which we provide in this report, of an overall positive fiscal impact. In consideration of the potential ambiguity associated with the definition of the overall fiscal impact to the state, we have consulted with the Michigan Economic Development Corporation and Michigan Department of Treasury to develop a definition.

We concluded that the most appropriate definition of the overall fiscal impact to the state is the net present value of the projected gross increase in state tax revenues generated by the proposed TBP, minus the present value of the expected cost of state tax incentives associated with the proposed TBP, as revised by SB Friedman.

Costs and Benefits Considered

Our definition of the overall fiscal impact to the state excludes potential fiscal impacts on local governments. In principle, fiscal impacts on local governments could have a direct fiscal impact on the state government. Most prominently, revenues from school operating taxes levied on nonhomestead property may increase as a result of a TBP. Those tax revenues in turn may impact the state's payments to local areas through the School Aid Fund. However, this possibility is less important to the state of Michigan for TBPs in the city of Detroit because of the prominence of the city's Renaissance Zones, which exempt property from many taxes. It is possible that the analysis of future TBPs, located in other parts of the state, will consider the impact on local tax revenues if those impacts are expected to affect the state's fiscal position directly.

Our definition of the overall fiscal impact to the state focuses on the proposed TBP's net impact on state tax revenues. Therefore, it excludes nontax revenue impacts that may be associated with federal funds connected to new residents, as well as potential costs of providing public services to new residents of the state.

Measurement Period

The legislation establishing the TBP program allows capture of property tax revenue for up to thirty years after the completion of the projects, while the construction phase may take up to five years. Therefore, we consider costs and benefits within thirty-five calendar years from the original approval of the TBP plan by the local Brownfield Authority. For this TBP, that approval came in 2017, which was also the year that construction on the project began. Therefore, we consider costs and benefits through the year 2052. We apply the same time horizon to all sites in the proposed TBP.

Discounting Cash Flows

We used standard discounted cash flow analysis to calculate a net present value, as of 2017, of the fiscal benefits and costs to the state projected to be generated by the TBP in each year. In principle, it could be appropriate to discount the increased tax revenues associated with the TBP at a different rate than the tax incentives captured by the developer. Because the tax captures are tied directly to the amount of economic activity at the TBP sites, however, we judge that the fiscal benefits to the state are likely to

be generally correlated with the costs to the state in most scenarios. Therefore, we apply a single discount rate to the net cash flows to the state in each year in our net present value analysis.

We examined tax increment financing bond issuances from September 2017 through January 2018 in collaboration with SB Friedman to identify an appropriate discount rate for the analysis. We considered new money issuances by municipal special improvement districts or community improvement districts that did not fund public facilities and did not carry any general obligation protection or other backstop. The yields on the taxable bonds we reviewed ranged from 4.2 percent to 6.4 percent, and the yields on the tax-exempt issuances ranged from 3.7 percent to 5.2 percent, or a taxable equivalent yield of 5.1 percent to 7.3 percent at a 28 percent tax rate.

Based on these comparable rates, we chose a rate of 6.0 percent per year as our preferred discount rate. The use of a market-based reference rate should approximate the social cost of funds associated with a project with the average risk characteristics of projects that are financed with tax increment financing. To the extent that the risk characteristics of the proposed TBP vary substantially from those average characteristics, this approach may understate or overstate the social costs of those funds. In our assessment, however, the chosen discount rate is appropriate given current market interest rates and the risk characteristics of the proposed TBP.

Estimating the Increase in Tax Revenues Generated by the Proposed TBP

The MEDC has conducted impact studies to estimate the economic effects and state revenue generated by various projects and programs it has considered in the recent past. The methodology for those studies includes a process to estimate state government tax revenue generated by the economic activity predicted for a particular project or program. In turn, the revenue calculator allows development of return-on-investment measures for various incentive programs. Project staff at RSQE played a role in developing the revenue calculator in conjunction with the MEDC, and we have adapted the methodology for the fiscal impact analysis of TBPs.

More specifically, the economic effects of a proposed project over time were estimated by entering relevant project inputs into the REMI PI+ model and having the model process the results. Because the REMI PI+ model does not provide estimates of the state government tax revenue associated with the resulting economic activity, a post-processing approach is required to translate the economic results into revenue impacts. As part of the Transformational Brownfield Redevelopment project, we have updated and revised the process used to estimate state government revenue resulting from any proposed project.

The previous revenue calculator generates only an aggregate measure of state government revenue. One of the major revisions to the approach for this project was to generate estimates for six categories of state government revenue: 1) business taxes; 2) personal income taxes; 3) sales and use taxes; 4) gambling taxes; 5) state property taxes; and 6) all other state tax revenues.

The fundamental approach to estimating these component revenue sources was the same as the methodology for the aggregate measure. First, we identified the historical dollar value of tax revenue

using information from the Michigan Department of Treasury.[31] Second, we divided this value by the relevant taxable income (derived from components of BEA-published personal income series and generated by the REMI model) to determine the historical effective tax rate. The taxable income used varied by tax category. Third, we multiplied this rate by the estimated change in taxable income generated by the project under consideration to generate estimates of the tax revenue expected to be generated by the project.

Each of the six tax revenue calculations is described below. The effective tax rates calculated for each category appear to be fairly stable over time. They should provide reasonable estimates of the tax revenues generated by future brownfield redevelopment projects, provided state government tax policy does not change substantially over the course of the analysis period.

The data we used to calculate the taxable income for each tax category came from the Bureau of Economic Analysis November 2017 data file. The annual BEA data were converted to Michigan fiscal years by summing 25 percent of the annual value in the preceding year and 75 percent of the annual value in the calendar year that corresponds to the fiscal year. For example, in calculating the taxable income base for fiscal year 2013, we summed one-fourth the annual value in calendar year 2012 and three-fourths the annual value for 2013.

Business Taxes

The Michigan Department of Treasury reports that business taxes, net of the cost of previous tax incentives, generated between $1.29 billion and $1.43 billion in revenue annually between fiscal years 2013 and 2016. The taxable income base that we used to determine the tax rate for this source of state government revenue was private sector earnings. Dividing business tax revenue by the corresponding fiscal year private sector earnings generates estimates of the effective business tax rate of between 0.501 percent and 0.577 percent for fiscal years 2013 through 2016. In our calculation of business tax revenue, we used the average effective tax rate over this period of 0.557 percent of private sector earnings.

Personal Income Taxes

The Michigan Department of Treasury reports that personal income taxes generated between $8.01 billion and $9.37 billion in revenue annually between fiscal years 2013 and 2016. The taxable income base that we used to determine the tax rate for this source of state government revenue was the sum of wage and salary income, total proprietor's income, and our estimate of capital income that is subject to Michigan's personal income tax.

Estimating the capital income of Michigan residents that is subject to the state income tax is complicated. Some components of capital income that are subject to Michigan's personal income tax, such as capital gains, are not reported in the BEA personal income data. Other components of personal income include both taxable and nontaxable income, such as dividend and interest income earned by retirement funds. Thus, our challenge was to estimate capital income in Michigan that is subject to the Michigan personal income tax and to link it to dividend and interest income reported by the BEA.

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[31] RSQE maintains a database of state revenue collections from various sources that is compiled from several decades of monthly and annual revenue reports provided by the Michigan Department of Treasury. That database is the source of the historical tax revenue data in the calculations that follow.

To do this we used tax return data from the Internal Revenue Service. These data show dividend, interest, and capital gains income that is subject to the federal personal income tax. For example, according to the IRS tax return data for 2015, capital gains income in Michigan was $11.12 billion, taxable interest income was $2.11 billion, and dividend income was $6.03 billion. The IRS reports that taxable capital income in Michigan was equal to between 84.2 percent and 88.6 percent of BEA-reported dividend and interest income between 2013 and 2015. In our estimation of future taxable capital income in Michigan, we used the average over this period of 86.5 percent of dividend and interest income.

Dividing personal income tax revenue by the corresponding fiscal year taxable income base (the sum of wages and salaries, proprietors' income, and taxable capital income) generates estimates of the effective personal income tax rate of between 2.87 percent and 3.12 percent for fiscal years 2013 through 2016. In our calculation of personal income tax revenue, we used the average effective tax rate over this period of 3.04 percent.

Sales and Use Taxes

The Michigan Department of Treasury reports that sales and use taxes generated between $8.42 billion and $8.81 billion in revenue annually between fiscal years 2013 and 2016. The taxable income base that we used to determine the tax rate for this source of state government revenue was the sum of wages and salaries, proprietors' income, taxable capital income, and the cash income portion of personal transfer payment income, minus employee contributions for social insurance and personal tax payments. The cash income portion of transfer payments includes the following categories of personal income: retirement and disability benefits; Supplemental Security Income (SSI); Earned Income Tax Credit (EITC); other income maintenance payments; unemployment insurance compensation; veterans' benefits; other transfer receipts of individuals from government; and transfer receipts of individuals from businesses. Dividing sales and use tax revenue by the estimates of the tax base generates effective tax rates of between 3.17 percent and 3.34 percent between 2013 and 2016. In our calculations of sales and use tax revenue, we used the average effective tax rate over this period of 3.26 percent.

Gambling Taxes

The Michigan Department of Treasury reports that gambling taxes generated between $0.84 billion and $1.00 billion in revenue annually between fiscal years 2013 and 2016. The taxable income base that we used to determine the tax rate for this source of state government revenue was the same as for the sales and use tax.

Dividing gambling tax revenue by the estimates of the tax base generates effective tax rates of between 0.32 percent and 0.36 percent between 2013 and 2016. In our calculation of gambling tax revenue, we used the average effective tax rate over this period of 0.34 percent.

State Property Taxes

The Michigan Department of Treasury reports that the state property tax generated between $1.77 billion and $1.90 billion in revenue annually between fiscal years 2013 and 2016. The taxable income base that we used to determine the tax rate for this source of state government revenue was the sum of the taxable income base used in the sales and use tax calculation and rental income. Note that rental income is not used in any other taxable income base calculation, because it predominately reflects an imputed estimate of the rental income of owner-occupied property.

Dividing property tax revenue by the estimates of the tax base generates effective tax rates of between 0.65 percent and 0.67 percent between 2013 and 2016. In our calculation of state property tax revenue, we used the average effective tax rate over this period of 0.66 percent.

All Other State Taxes

The Michigan Department of Treasury reports that all other taxes generated between $1.40 billion and $1.54 billion in revenue annually between fiscal years 2013 and 2016. The taxable income base that we used to determine the tax rate for this source of state government revenue was the same as for the sales and use tax.

Dividing all other tax revenue by the estimates of the tax base generates effective tax rates of between 0.53 percent and 0.56 percent between 2013 and 2016. In our calculation of all other tax revenue, we used the average effective tax rate over this period of 0.55 percent.

Computational Details

The REMI model generates all the personal income components necessary to calculate the taxable income tax base for each tax revenue category. However, to avoid any change in the personal income categories caused by changes in the local price level, we converted the simulation estimates of the nominal personal income values into inflation-adjusted 2009 dollars. We then compared these values to the control simulation personal income values, also expressed in 2009 dollars. We next converted the differences in personal income in real terms into a difference in personal income in nominal terms using the price deflator from the control forecast. Finally, we applied the appropriate effective tax rates to the appropriate income tax bases to produce estimates of the nominal state government tax revenue generated by the project.

Results of Economic Impact Analysis

Figure 1 displays projected employment at the proposed TBP grouped into the Office, Retail Trade, Accommodation and Food Services, and Construction sectors. The Office sector includes several sectors in the REMI model: Information; Finance and Insurance; Real Estate and Rental and Leasing; Professional, Scientific, and Technical Services; Management of Companies and Enterprises; and Administrative and Waste Management Services. The projected job counts for the categories other than Construction are entered directly into the REMI model as inputs. The job additions in the Construction sector are estimated by the REMI model primarily as a function of the construction spending associated with the project.[32]

The estimated employment impact ramps up through 2023, as the four sites are completed and come into operation. The increase in Construction sector employment peaks at 6,357 jobs in 2020, before falling to approximately zero by 2023 (the employment totals for each category cannot be read directly from the figure because the categories are stacked). The job counts associated with the operations phase of the project stabilize by 2024, at 5,955 Office sector jobs (including jobs in Exhibition and Event spaces), 993 jobs in Accommodation and Food Services, and 790 jobs in Retail Trade. The total projected increase in direct employment at the TBP sites in 2024 is 7,738 jobs.[33]

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[32] We report the Construction sector job counts as projected employment at the TBP sites through the end of the construction phase of the project in 2022. The construction jobs that result from the project in later years are primarily indirect jobs, so we do not report them in the direct job counts. This reporting convention does not affect the analysis or results.

[33] The reported direct job counts outside of the Construction sector come from our calculations based on data provided by the developer and are used as inputs into the REMI model. The direct jobs in the Construction sector are outputs of the REMI model, driven primarily by the hard and soft construction spending associated with the project.

Figure 1: Projected Employment at the TBP Sites

Note: Office sector includes Information, Finance and Insurance, Real Estate and Rental and Leasing, Professional, Scientific, and Technical Services, Management of Companies and Enterprises, and Administrative and Waste Management Services. Construction employment is estimated by the REMI model primarily from construction spending; the impact in later years includes indirect jobs, so we report the number of projected construction jobs at the TBP sites as zero after the end of the construction phase in 2022.
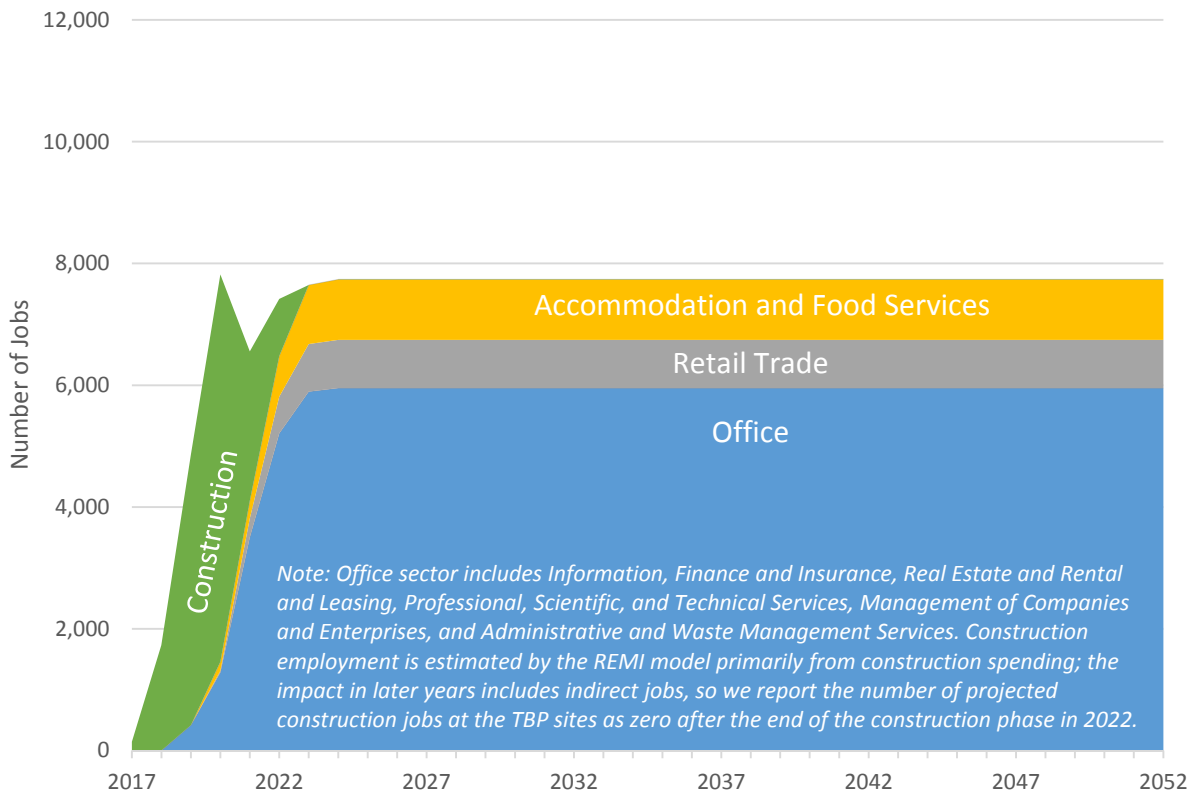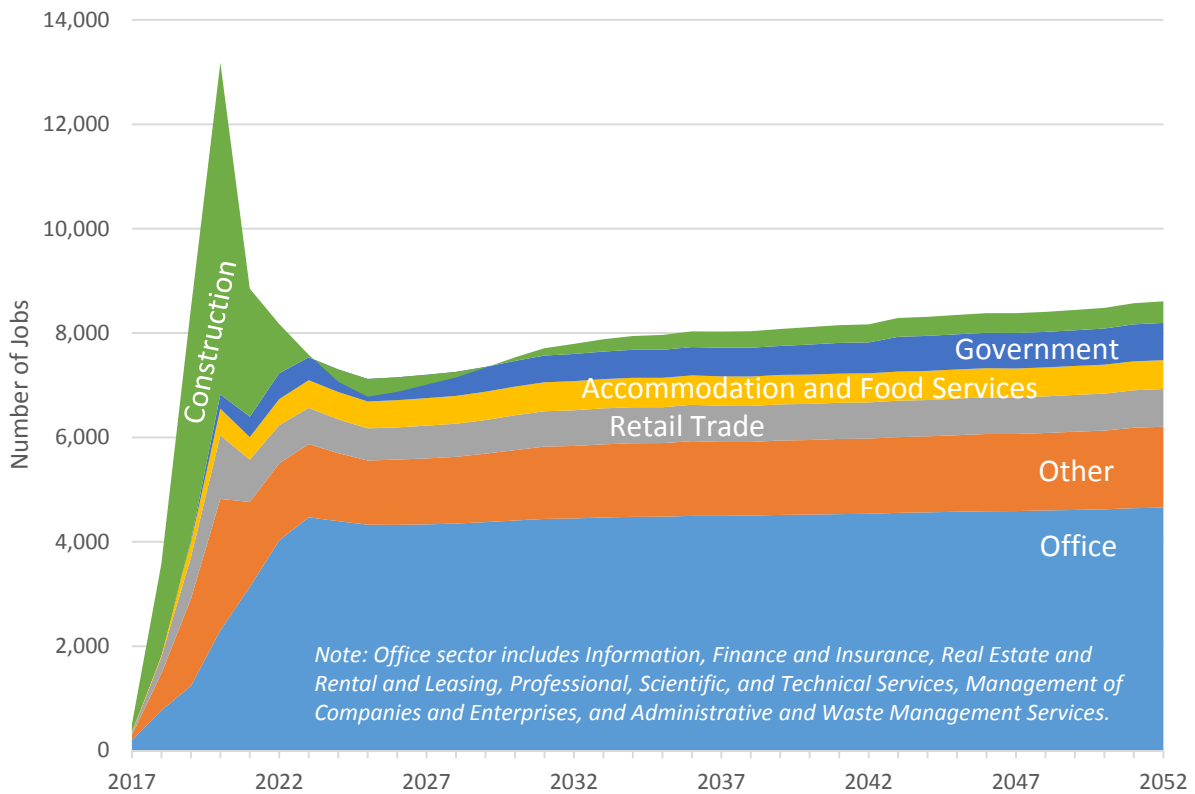
Figure 2 displays our estimates of the proposed TBP's effect on net jobs in the state of Michigan. The projected job additions are again split out by sector, with additional breakouts for the Government and Other sectors.[34] The estimated job impact peaks at 13,180 net job additions in 2020, with the large number of added construction jobs. After the construction period finishes, the total job additions fall to 6,782 in 2025 and then grow slowly, reaching 8,608 by 2052.

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[34] The Other sector comprises Forestry, Fishing, and Related Activities; Mining; Utilities; Manufacturing; Wholesale Trade; Transportation and Warehousing; Private Educational Services; Health Care and Social Assistance; Arts, Entertainment, and Recreation; and Other Services, except Public Administration.

Figure 2: Statewide Net Job Additions

Note: Office sector includes Information, Finance and Insurance, Real Estate and Rental and Leasing, Professional, Scientific, and Technical Services, Management of Companies and Enterprises, and Administrative and Waste Management Services.

Some of the direct jobs created at the TBP sites displace other jobs in the state and some of the direct jobs are net new. As discussed in the methodology section, the input-output estimates in the REMI model will treat a certain fraction of direct jobs in each sector as net new. Additionally, we treat a small fraction of the jobs planned to be added by the Family of Companies as exogenous to reflect that they have a much stronger export orientation than is typical in their industry. Treating a larger fraction of the employment additions at the Family of Companies as exogenous would have produced larger estimated net job additions. We believe that our baseline approach is likely to be conservative relative to the fraction of jobs at the Family of Companies that are likely to have a strong export orientation.

Table 4 shows that in 2035, roughly halfway through our analysis period, employment in the Office sector accounts for 4,483, or 56.3 percent, of the 7,963 total statewide net job additions. Retail Trade accounts for 689 statewide net job additions, or 8.7 percent of the total, while Accommodation and Food Services add 563 net jobs statewide, 7.1 percent of the total. In all three sectors, the statewide increase in employment is smaller than the number of projected direct jobs at the TBP sites, consistent with substantial displacement within the state in these industries.[35] The Construction sector adds 285 jobs statewide, Government adds 535 jobs, and all other industries add 1,407 jobs. The job additions in these sectors in 2035 are entirely multiplier jobs.

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[35] The displacement effect in these industries is larger than the numbers in Table 4 indicate because some of the net increase in statewide employment comes from the demand induced by the direct job additions.

Overall, the statewide employment multiplier in 2035 is just over 1.0. The overall employment multiplier is 0.88 in 2025, shortly after the construction phase of the project concludes. It grows slowly over the analysis period, reaching 1.11 by the end of the analysis period in 2052. The overall employment multiplier reflects the relatively high economic displacement associated with the direct job additions in the Accommodation and Food Services and Retail Trade sectors in combination with the relatively lower displacement and higher induced jobs associated with the direct job additions in the Office sector.

Table 4: Direct Jobs vs Net Increase in Statewide Employment by Sector, 2035

	Direct Jobs	Net Increase in Employment
Office*	5,955	4,483
Accommodation and Food Services	993	563
Retail Trade	790	689
Construction	0	285
Government	0	535
Other	0	1,407
Total	7,738	7,963

*Jobs in Events & Exhibitions (shown in Table 2) from the TBP are included in the Office category.

Figure 3 displays our estimate of the increase in Michigan's population as a result of the proposed Transformational Brownfield Plan. The state adds 8,922 residents by 2023, driven by the increase in statewide employment. The increase in the state's population continues to rise over time, driven by the amenity benefits of the proposed development and natural population growth (e.g., births minus deaths) from new residents who initially move to the state as a result of the increase in employment. We estimate that the proposed TBP will increase the state's population by 16,432 residents by the end of our analysis period in 2052.

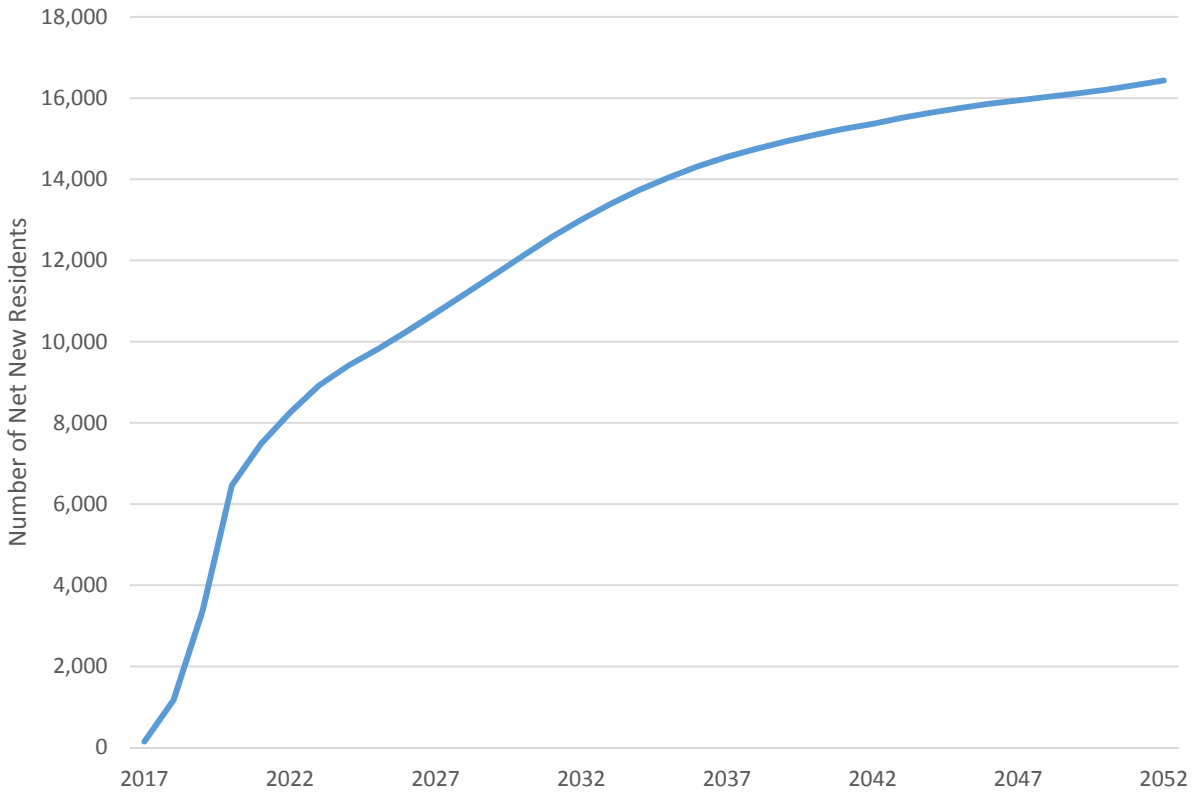## Figure 3: Increase in State Population

Figure 4 displays our estimate of the increase in Michigan real personal income generated by the proposed TBP, measured in inflation-adjusted 2009 dollars. The increase in personal income reaches $834 million in 2020, during the construction period of the project, before settling to $569 million in 2025. Approximately $451 million of the increase in 2025 is wage and salary income. Given the total statewide increase in employment of 6,782 jobs in 2025, the average salary of the net new jobs generated by the proposed TBP is projected to be $66,446 that year. That relatively high average salary reflects the large proportion of jobs generated in the Office sectors, including at the Family of Companies. The increase in real personal income generated by the proposed TBP then rises over the remainder of the analysis period, with the projected increase in real incomes reaching $987 million in 2052.
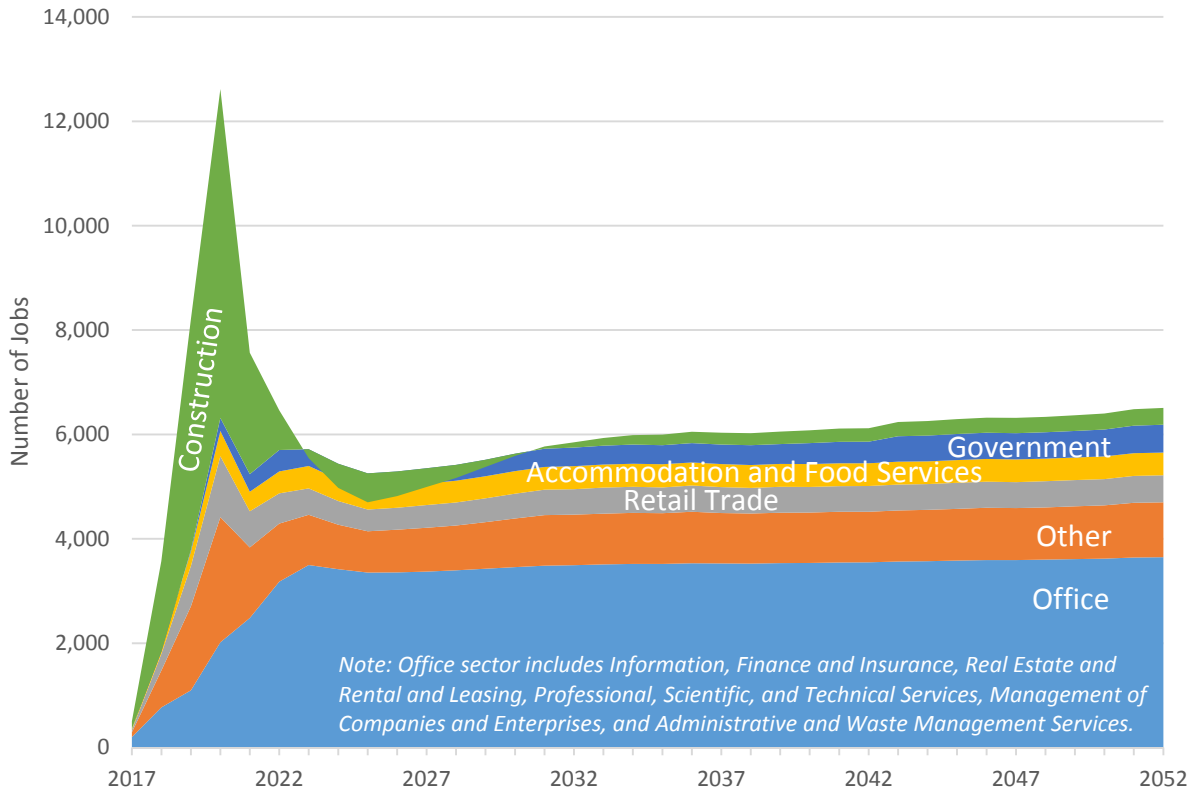
Figure 4: Increase in Michigan Real Personal Income
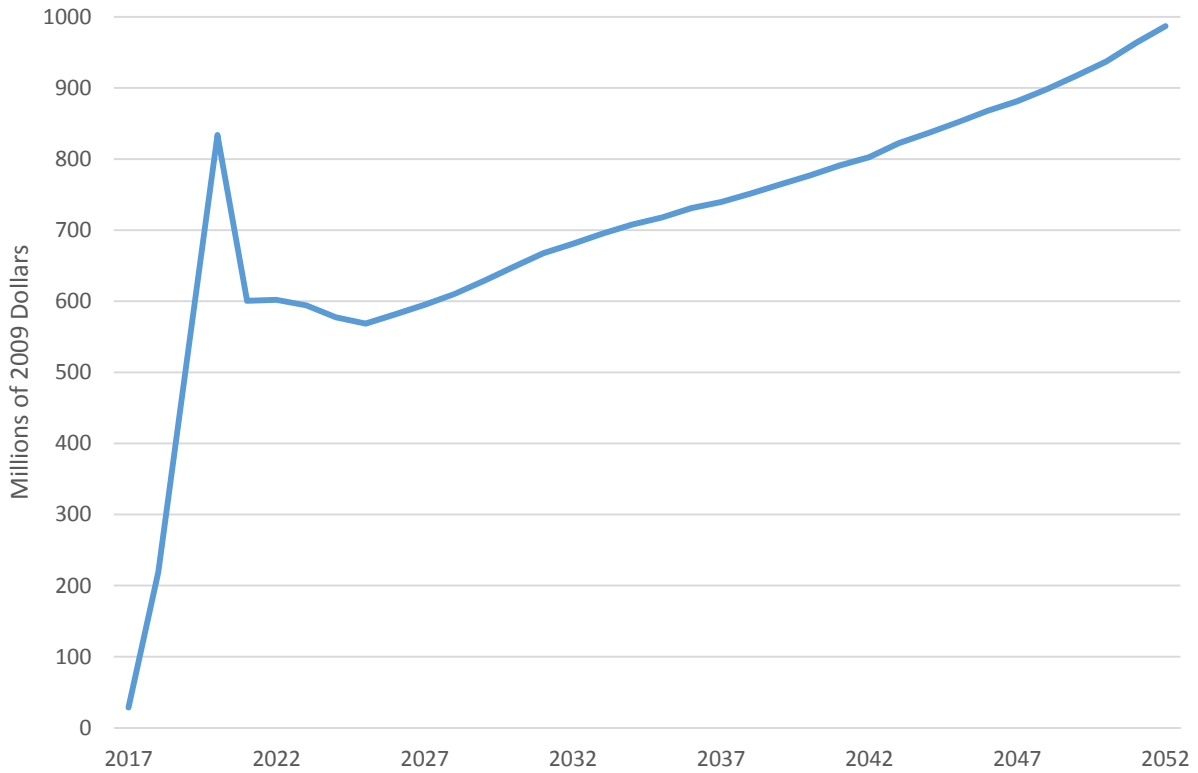

Adverse Scenario Impacts

The proposed TBP has smaller economic impacts on the state under the assumptions in the adverse scenario. The number of direct jobs at the proposed TBP sites is 7,099 in the stabilized operations phase of the project, approximately 8 percent lower than in the baseline scenario. Figure 5 displays the projected statewide net job additions by sector in the adverse scenario. After the end of the construction phase of the project, the total statewide job additions range from a minimum of 4,699 in 2025 to a maximum of 6,508 in 2052. The net job additions in the adverse scenario range from 69 percent to 76 percent, as large as the additions in the baseline scenario from the end of the construction period to the end of the analysis period.

Figure 5: Statewide Net Job Additions - Adverse Scenario

Note: Office sector includes Information, Finance and Insurance, Real Estate and Rental and Leasing, Professional, Scientific, and Technical Services, Management of Companies and Enterprises, and Administrative and Waste Management Services.

Results of Fiscal Impact Analysis

Figure 6 displays our estimates of the total increase in state tax revenues generated by the proposed TBP alongside the cost of the estimated tax incentives. Both amounts are expressed in nominal dollars (unadjusted for inflation).[36] The value of the increased tax revenues is larger than the cost of the tax incentives in each year of the analysis period. The increase in state tax revenues is $69 million in 2020, during the construction phase of the project, when the total tax incentives to the developer are projected to total $24 million. The increase in revenues and the value of the tax incentives are projected to fall in 2021 as construction at some of the TBP sites concludes, to $49 million and $16 million, respectively. The projected cost of the tax incentives falls further in 2022, to $8 million. After 2022, the projected cost of the tax incentive generally grows. The value of the increased tax revenues is approximately flat between 2021 and 2026, after which it also tends to grow. In 2042, the value of the increased tax revenues totals $83 million and the cost of the tax incentives reaches $24 million. The projected cost of the tax incentives falls sharply to $10 million in 2043 with the expiration of several categories of tax capture. The projected cost of the tax incentives then stays in the $10 to $13 million per year range through the end of the analysis period in 2052, while the projected value of the increase in tax revenues continues to rise, reaching $117 million in that year.


Figure 6: Michigan Tax Incentives and Increased Tax Revenues

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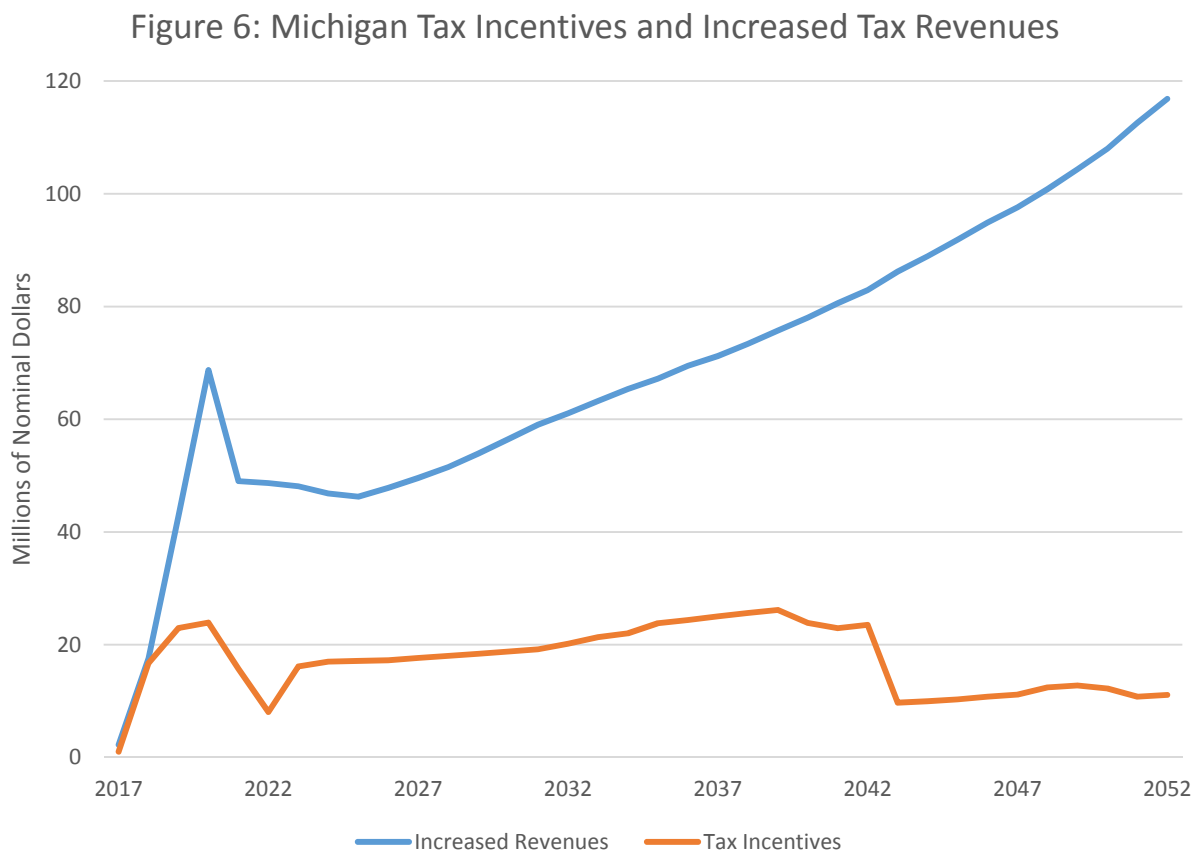
[36] Appendix III includes a table displaying the numerical values for each year.

Discounting both the value of the increased state tax revenues and the cost of the tax incentives at 6.0 percent per year, we project the present value as of 2017, expressed in 2017 dollars, of the increase in tax revenues to be $861 million and the present value of the cost of the tax incentives to be $265 million. Therefore, we project the net fiscal benefit to the state of the proposed TBP to be positive -- $596 million. We estimate that the ratio of the increased tax revenues to the cost of the tax incentives generated by the proposed TBP to be 3.2 to 1.[37]

Figure 7 displays the sources of the projected increase in state tax revenue generated by the proposed TBP, scaled by the proportion of the total increase in the present value of revenues from each source. The personal income tax accounts for the largest increase in state tax revenues, 38 percent. Sales and use taxes account for an additional 35 percent of the increase, followed by business taxes at 10 percent, state property taxes at 7 percent, and gambling taxes at 4 percent. All other taxes account for 6 percent of the increase in state tax revenues.

Figure 7: Increased Michigan Tax Revenue by Tax, Present Value

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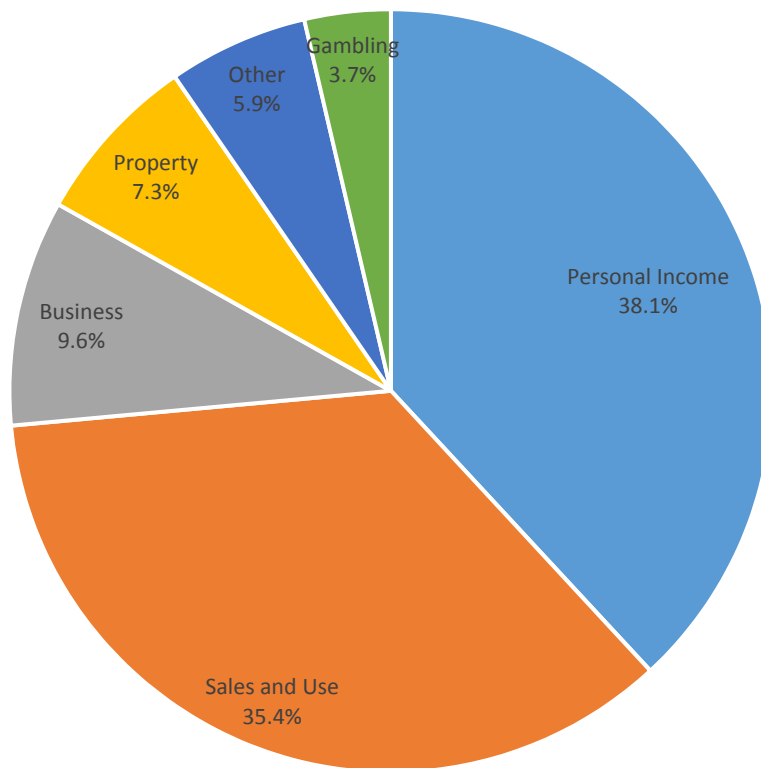
[37] Because the increase in tax revenues is projected to be greater than the cost of the tax incentives in every year, the projection that the proposed TBP will generate a positive fiscal benefit to the state does not depend on the discount rate.

Adverse Scenario Results

Figure 8 displays the results of the fiscal impact analysis under the assumptions in the adverse scenario.[38] Similarly to the baseline scenario, the projected increase in tax revenues is larger than the projected cost of the tax incentives in every year of the analysis period. After the end of the construction period, the increase in tax revenues under the adverse scenario ranges from 66 percent to 71 percent, as large as in the baseline scenario. On a present value basis, the increase in state tax revenues generated by the proposed TBP is $630 million, implying a net fiscal benefit to the state of $364 million. The ratio of the present value of increased tax revenues to the present value of the cost of the tax incentives is 2.4 in the adverse scenario. That ratio is lower than the 3.2 ratio in the baseline scenario, but still implies that the increase in revenues in the adverse scenario is substantially larger than the cost of the tax incentives. Therefore, we conclude that the proposed TBP is likely to produce a net fiscal benefit to the state even under a set of assumptions that we believe is substantially more conservative than our baseline expectations for the project.

Figure 8: Michigan Tax Incentives and Increased Tax Revenues - Adverse Scenario

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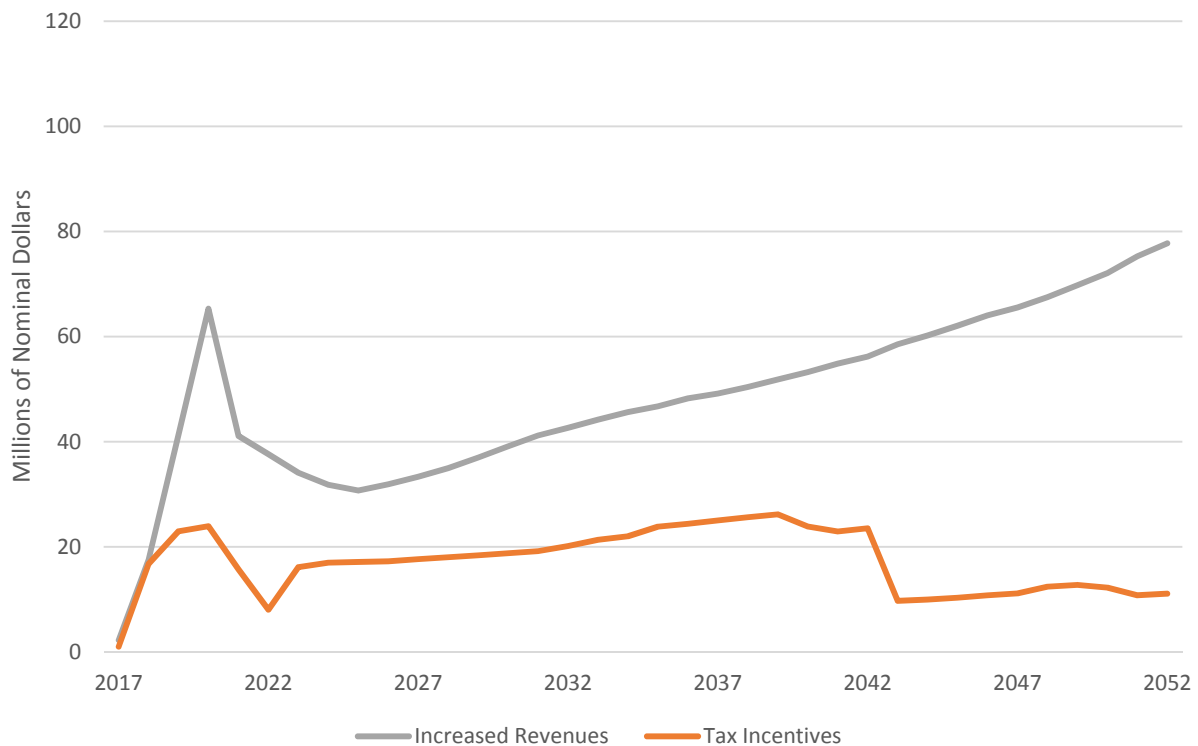
[38] The projected cost of the tax incentives in the adverse scenario does not differ from those in the baseline scenario because we expect the developer to qualify for the maximum approved tax incentives under either scenario.

Limitations of the Analysis

The analysis in this report is subject to several potential limitations, some of which will lead the analysis to overstate the benefits of the proposed TBP to the state of Michigan, and others that will lead the analysis to understate those benefits. In the interest of transparency and to help readers to assess the likely effects of those limitations, we discuss them briefly in this section.

Some limitations that will lead the analysis to overstate the benefits to the state of Michigan are:

- The analysis does not consider the potential increase in the cost of providing government services to the additional residents and businesses who will live in the state as a result of the TBP. Those costs were excluded from the analysis under guidance from the MEDC and Michigan Department of Treasury due to the difficulty in reliably quantifying their magnitude. Several features of the proposed TBP suggest that the marginal costs of providing such government services are likely to be lower than Michigan's average per capita cost of providing government services, however:
  - Some government costs do not scale directly with the population, so they may not increase with additional residents.
  - The city of Detroit has historically housed a substantially larger population than it does today, so some aspects of its infrastructure may not need to be expanded to accommodate new residents.
  - Federal transfers for certain programs will increase with the state's population, defraying some costs associated with new residents.
  - The new residents of the TBP properties are likely to have substantially higher than average incomes. Likewise, new residents of the states drawn by new employment opportunities may be more likely than average to be employed. Both sets of potential new residents may therefore require less than average social and other programmatic assistance.
- Consistent with current Michigan law, the analysis does not consider the possibility that some companies that locate in the proposed TBP developments may receive tax incentives apart from the incentives given to the TBP developer. The provision of any additional tax incentives would reduce the incremental tax revenues the proposed TBP is projected to generate.
- Consistent with the spirit of legislation that established the Transformational Brownfield Plan program in Michigan, the analysis uses a "but for" approach that assumes the developer would not engage in any redevelopment of the TBP sites in the absence of tax incentives. Likewise, the analysis uses a "but for" approach for a portion of the employment additions planned by the Family of Companies. Realistically, the developer likely would engage in some redevelopment of the sites so that the "but for" assumption in this analysis overstates the TBP's likely benefits to the state. The "but for" assumption is likely to be more realistic in this case than in many others given the paucity of transformational development projects of the proposed TBP's scale in the city of Detroit recently. Although in very recent times the pace of development activity in the city, including proposed developments, has accelerated, some of this acceleration may be due to the catalytic effect of the proposed TBP.

Conversely, some limitations that will lead the analysis to understate the benefits to the state of Michigan are:

- Consistent with the spirit of the legislation that established the Transformational Brownfield Plan program in Michigan, the fiscal impact analysis does not consider any increase in local tax revenues that might result from the proposed TBP. The REMI model does endogenously increase local government employment in response to an increase in local population, which implicitly reflects the expectation of higher revenues. In our judgment, the REMI model's default response is likely to underestimate the true local revenue impacts of the proposed TBP.
- The period for the analysis encompasses thirty-five years from the approval of the TBP, at which time all tax incentives associated with the TBP will have ended. The economic and fiscal benefits to the state could continue beyond that period, however.
- We believe that the assumptions we have used in the analysis are generally conservative. Many assumptions were derived from industry averages or government data for the economy as a whole, although the unusual features of the proposed TBP developments may lead them to have larger economic impacts than implied by those averages. Workers in the Family of Companies are likely to engage in much more export-oriented work than typical workers in the mortgage industry, who are likely to serve a more local market.

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Appendices

I.   Biographical Sketches
    a. Report Authors
    b. Expert Panel Members
II.   Literature Review References
III.   Numerical Values of Annual Estimates of Increased Tax Revenues and Cost of Tax Incentives

Appendix I: Biographical Sketches

Report Authors

Dr. **Gabriel Ehrlich** received his Ph.D. in economics from the University of Michigan. He is the director of the University's Research Seminar in Quantitative Economics (RSQE), an economic forecasting and policy evaluation unit within the Economics Department. His research focuses on several areas of housing and land economics as well as the effects of wage rigidity on labor market outcomes. His work has been discussed in *The Economist*, *The Financial Times*, and *The Washington Post*, and his recent article, *Economic Effects of Medicaid Expansion in Michigan*, was published in the *New England Journal of Medicine*.

Prior to joining RSQE, Dr. Ehrlich worked in the Financial Analysis Division at the Congressional Budget Office (CBO), where he forecasted interest rates and conducted analysis on monetary policy and the mortgage finance system. He has also worked as a financial analyst in the mortgage banking industry. He earned his undergraduate degrees in finance and economics at the University of Maryland, where he was chosen by the faculty as the outstanding graduate in finance during his senior year.

Dr. Ehrlich testifies twice per year to the state legislature on Michigan's fiscal and economic prospects, which the state uses as a guide to determining expected future revenues. He is a coauthor recently of *The U.S. Economic Outlook for 2017–2019* and *The Michigan Economic Outlook for 2018–2019*.

Donald Grimes received his Master's Degree in economics from the University of Michigan. He is a senior research area specialist at RSQE. His primary research interests are in labor economics and economic forecasting. For more than 30 years, he has been engaged in economic forecasting for state and local governments and is frequently called upon for policy advice. He has worked for many years with the Michigan departments of Transportation and Treasury and the Michigan Economic Development Corporation on policy analysis and evaluating economic strategies. He is co-director of a project to generate long-term economic and demographic projections for all the counties of Michigan. His past research includes a study looking at Michigan's industrial structure with a view to identifying sectors that will promote economic growth in the future.

He has been involved in research projects sponsored by the U.S. Department of Commerce, the U.S. Department of Labor, the Federal Reserve Bank of Chicago, and the Robert Wood Johnson Foundation. His recent publications include *The Michigan Economic Outlook for 2018–2019*; *Stabilizing and Sustaining: The Economic and Demographic Outlook for Southeast Michigan through 2045*; *Exploring Wage Determination by Education Level: A U.S. Metropolitan Statistical Area Analysis from 2005 to 2012*, published in *Economic Development Quarterly*; and *Economic Effects of Medicaid Expansion in Michigan*, published in the *New England Journal of Medicine*.

Dr. **Michael McWilliams** received his Ph.D. in economics from the University of Michigan. He is a Michigan forecasting specialist at RSQE. His research focuses on a range of topics in environmental and natural resource economics, including land use change and its causes and environmental consequences, regulation of light-duty vehicles, and the impact of the ethanol mandates. His work has been published in the *Proceedings of the National Academy of Sciences* and *Energy Policy*.

Dr. McWilliams assists with RSQE's forecasts of the Michigan economy and tax revenues four times per year, and is a coauthor recently of *The Michigan Economic Outlook for 2018–2019*.

Dr. Jim Robey is the Director of Regional Economic Planning Services at the W.E. Upjohn Institute for Employment Research. Dr. Robey's research and technical assistance on economic issues and in economic and workforce development has assisted corporate, nonprofit, and economic and workforce development entities in problem resolution and strategic decision making, from the local to the national levels. Spanning more than three decades, his expertise includes industry studies, applied occupational analysis, economic impact modeling and analysis, economic and workforce development research and analysis, and site selection assistance. His research focuses on regional economic, education, economic development, and workforce development issues across Michigan and the nation. He prepares annual employment forecasts for southwest Michigan's metropolitan areas, directs the production of Business Outlook for West Michigan, and provides economic insights for regional economic development across northwest Ohio, and the states of Ohio, Pennsylvania, West Virginia, Maryland, New York, and New Jersey. He has additionally coauthored research on a variety of national and regional issues. He received his Ph.D. in Urban Studies (1997), with an emphasis on Economic Development, and his Master's degree in Public Administration (1993) from the Levin College of Urban Affairs, Cleveland State University. He earned his Bachelor's degree in Sociology (1979) from Edinboro State College.

Expert Panel Members

George A. Erickcek is co-editor of the *Economic Development Quarterly,* a national, peer-reviewed academic journal on economic and workforce development, and a regional consultant for the W.E. Upjohn Institute for Employment Research. Previously, he was the Senior Regional Analyst for W.E. Upjohn Institute, where he used the REMI model on a variety of applications for over 25 years. He received his Master's Degree in economics from the University of Pittsburgh.

Peter E. Gunther is Senior Research Fellow, Connecticut Center for Economic Analysis at the School of Business, University of Connecticut, and President, Smith Gunther Associates Ltd., Ottawa. He has served Canada as a member of the Canadian bench, Chief of Contentious Issues on the Canadian Constitution, prior to being appointed by Africa's International Government Authority on Development as its Resource Person for the Wealth Sharing Table for the Sudanese Peace Negotiations. His professional interests are in the evolution of novel medical treatments and the general expansion of wellbeing culminating in performance measurement of:

- Improvements to Canada's blood supply;
- Assessing benefits of expanding the School of Medicine and Dentistry at UConn with a large Biosciences Centre (50 Full Professors);
- Measuring achievements of the "Brain Repair Centre" at the Halifax Infirmary;
- Establishing the benefits of National Research Council's development of a Meningitis vaccine;
- Launch of an institute to reinvigorate limbs – a product of stem cell research;
- Building a trail down the Naugatuck River to increase participation in walking and bicycling; and,
- Accelerating the adoption of electric vehicles.

He has been responsible for CCEA's Economic Outlook for most of the last decade and is currently transitioning it to the New England Economic Partnership's (NEEP) framework deploying REMI.

Dr. Cynthia Kroll is Chief Economist and Assistant Director of Integrated Planning and Research for the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC). She oversees the Economic Development and Forecasting Group within Planning and Research, and is responsible for the regional forecast and agency research related to economics and demographics and supervises regional economic development efforts for the two organizations. Dr. Kroll oversees a team of professionals, and is a frequent speaker on economic topics. She has published widely specializing in topic areas that tie economic, social and scientific knowledge to public policy concerns at the state, regional, local, and industry levels. Her current work at ABAG/MTC involves methods and topics in forecasting economic and demographic growth in the region, an initiative to establish a regional economic development district in the San Francisco Bay Area, and an evaluation of the impacts of a 7.0 earthquake along the Hayward fault—the most urbanized fault in the country.

Prior to joining the regional agencies, Dr. Kroll served as Executive Director for Staff Research, and as a Senior Regional Economist for the Fisher Center for Real Estate and Urban Economics at the University of California Berkeley. She led major research projects on the California economy, the real estate industry, housing and land use policy, housing affordability, economic development, the globalization of labor markets, and the structure of the high-tech industry. She also researched green technologies in the economy and in building design, economic crises, and social, economic, land use and real estate considerations in natural disasters. She previously worked for the California Office of Economic Policy Planning and Research, SRI International, and as a consultant, primarily on the social and economic impacts of energy facilities.

Dr. Kroll is a member of Lambda Alpha (Land Economics honors society), the Urban Land Institute, the American Planning Association, the American Real Estate and Urban Economics Association, and the Industry Studies Association. She has served on the Research Council of the Bay Area Council Economic Institute and the California Controller's Office Council of Economic Advisors.

Dr. Kroll earned her Masters and PhD degrees in City and Regional Planning and a Bachelor's degree in Social Science and Art from the University of California Berkeley. She has published articles, books and reports on a wide range of topics. Recent research from ABAG includes the *Regional Forecast for Plan Bay Area 2040* (2016), *State of the Region* report (March 2015) and a working paper on "Effects of TOD Location on Affordable Housing Tenants" (September 2015). She is coeditor of *The Oxford Handbook of Offshoring and Global Employment* (Oxford University Press, 2013) and *Global Housing Markets* (John Wiley & Sons, 2012), and coauthor of *Globalization and a High Tech Economy* (Kluwer Academic Publishers, 2004) and *New Jobs for the Timber Region* (1984).

Colby Lancelin joined the Atlanta Regional Commission in March 2001. He is a Principal Planner, long-range planning forecaster, and econometric modeler in the Research and Analytics Division with the Atlanta Regional Commission (ARC). Mr. Lancelin is the program manager of the agency's Economic Analysis Program providing custom impact studies and economic assessments on developments of regional impact within the Atlanta Region. His work focuses planning resources around key regional issues assisting communities and civic leaders with measuring socioeconomic impact and assessing the cumulative effect of implementing various policies, development spending, and alternative

transportation investments and revenue-generating resources in the region. Mr. Lancelin received a Bachelor's degree in Geography from the University of South Alabama specializing in research methods in urban and economic geography and is a member and past president of the Atlanta Economic Club. In addition, he is a member of the Council for Community and Economic Research and holds the Certified Community Researcher (CCR) designation.

Rod Motamedi is a Research Manager at the University of Massachusetts Donahue Institute with over nine years of experience conducting economic and policy impact analyses, economic development and regional competitiveness assessments, and industry footprint studies. Prior to joining the Donahue Institute, Mr. Motamedi was a senior economic associate at Regional Economic Models, Inc. where he led client training and support, business development, and consulting projects. He is an expert in the application of economic models to high-visibility issues around the U.S. and internationally. Examples of his previous work include the economic impact of casinos, national immigration reform, film tax incentives, and higher education. His recent projects include an assessment of the creative economy of New England, the economic and social impacts of the introduction of casinos in Massachusetts, and contributions to the City of Cambridge Citywide Master Plan. Mr. Motamedi received his bachelors of arts in economics from the University of Massachusetts Amherst.

Appendix II: Literature Review References

Table A.1: Literature Review of Hedonic Estimates of Effects of Brownfield Restorations and Related Projects on Nearby Property Values [1]

Author	Location	Project Type	Estimated Project Cost	Reported Impact	Estimated Aggregate Increase in Residential Property Values [2]	Benefit-Cost Ratio
Kim (2009)	Lansing, MI	Housing Redevelopment	$6.5 million	$33.26 million	$33.26 million	5.1
Simons, Quercia, and Maric (1998)	Cleveland, OH	New Housing	$130,000 per unit	$670/unit of new construction in all housing within 2 blocks	$121,270 per $130,000 unit constructed	0.9
Kaufman & Cloutier (2006)	Kenosha, WI	Brownfield to Greenspace (park)	$2.5 million	$2.4 million to $7.0 million	$2.4 million to $7.0 million	1.0 to 2.8
Mihaescu (2010)	Cincinnati, OH	Cleanup Brownfield	$0.9 million per cleanup	$6,022 on each property within 1,000 feet of site	$111,407 per cleanup	0.1
Tuminario & Solis (1997) *as summarized in* Simons, Magner, & Baku (2003)	Savannah, GA	Housing Rehabilitation	$128,110	$96,960	$96,960	0.8
Ding, Simons, and Baku (2000) *as summarized in* Simons, Magner, and Baku (2003)	Multiple Locations	Housing Rehabilitation	N/A	$0.13 of increase per $1 spent	N/A	0.1
Simons, Magner, and Baku (2003)	Multiple Locations	Housing Rehabilitation	$2.97 million	10 projects with 334 rehabilitated units	$13.8 million	4.6

Notes:
1. We reviewed several additional studies, but many did not report results in a format that allowed for the calculation of an aggregate benefit-cost ratio.
2. For several studies, we calculated this ratio based on information reported in the original study.

Ding, Chengri, Robert A Simons, and Esmail Baku, 2000. "The Effect of Residential Investment on Nearby Property Values: Evidence from Cleveland Ohio" The Journal of Real Estate Research 19(1): 23-48.

Kaufman, Dennis A and Norman R Cloutier, 2006. "The Impact of Small Brownfields and Greenspaces on Residential Property Values" *The Journal of Real Estate Finance and Economics*, 33(1): 19-30.

Kim, Young-Tae 2009. "Measuring Indirect Benefits of Brownfield Redevelopment Using the Hedonic Price Method: The Cases of Lansing Michigan" A Dissertation, Michigan State University.

Mihaescu, Oana-Pusa 2010. "Brownfield Sites and Their Negative Impact on Residential Property Values: A Spatial Hedonic Regression Approach" A Dissertation, University of Cincinnati.

Simons, Robert A, A J Magner, and Esmail Baku, 2003. "Do Housing Rehabs Pay Their Way? A National Case Study" *The Journal of Real Estate Research* 25(4): 431-461.

Table A.2: Annual Estimates of Increased Tax Revenues and Cost of Tax Incentives
Generated by Proposed TBP (Millions of Nominal Dollars)

	Increased Tax Revenues - Baseline Scenario	Increased Tax Revenues - Adverse Scenario	Tax Incentives
2017	2.2	2.2	1.0
2018	17.6	17.6	16.7
2019	42.8	41.3	23.0
2020	68.7	65.3	23.9
2021	49.0	41.1	15.7
2022	48.7	37.6	8.0
2023	48.1	34.1	16.1
2024	46.8	31.8	17.0
2025	46.3	30.7	17.1
2026	47.8	31.9	17.2
2027	49.6	33.3	17.6
2028	51.5	35.0	18.0
2029	53.9	37.0	18.4
2030	56.5	39.1	18.8
2031	59.0	41.2	19.2
2032	61.1	42.6	20.2
2033	63.2	44.2	21.4
2034	65.4	45.6	22.0
2035	67.2	46.7	23.8
2036	69.5	48.3	24.4
2037	71.2	49.2	25.0
2038	73.4	50.4	25.6
2039	75.7	51.9	26.2
2040	78.0	53.2	23.9
2041	80.6	54.8	22.9
2042	82.9	56.2	23.5
2043	86.2	58.5	9.7
2044	88.9	60.2	10.0
2045	91.8	62.1	10.3
2046	94.9	64.0	10.8
2047	97.6	65.5	11.1
2048	100.8	67.5	12.4
2049	104.3	69.8	12.8
2050	108.0	72.1	12.2
2051	112.6	75.3	10.8
2052	116.8	77.7	11.1