W.E. UPJOHN INSTITUTE
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The Employment and Fiscal Effects of Michigan's MEGA Tax Credit Program

Upjohn Institute Working Paper No. 10-164

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April 2010

ABSTRACT

This paper estimates that Michigan's MEGA tax credit program to attract and retain businesses has large employment and fiscal benefits. MEGA provides discretionary tax credits to businesses, with the tax credit tied to the personal income taxes paid by employees on the new or retained jobs. We estimate the economic effects of MEGA using the Upjohn Institute's REMI model, and the research literature on how business location decisions respond to taxes. We estimate the fiscal effects of MEGA based on the research literature on how government spending and revenue respond to state personal income and population. The estimates suggest a lower bound to MEGA's effectiveness of being decisive in a little over 8 percent of the MEGA projects. Even with this modest success rate, MEGA is estimated to have fiscal benefits that offset about two-thirds of its gross fiscal costs. The net fiscal costs per job created of MEGA average less than $4,000 per job-year, which is less than the labor market benefits of job creation.

JEL Classification Codes: R11, R23, R28, R30, R58, H70

Key Words: State and local economic development policy, tax incentives, fiscal impact analysis, labor market benefits, regional multipliers

Acknowledgments: The authors thank Claire Black and, Wei-Jang Huang for their assistance with this paper, and Kevin Hollenbeck, Ben Jones, Eric Hanna, Michael LaFaive, and Theodore Bolema for comments on a previous draft. The authors would also like to acknowledge and thank the staff of the Michigan Economic Development Corporation (MEDC) for providing a portion of the data used in the analysis. No MEDC funding was received, however. The paper was prepared by Upjohn Institute staff members using funding from the Institute's endowment. The report's conclusions are those of the authors and should not be construed as official views of the Upjohn Institute or its Board of Trustees, or as views of those commenting on previous drafts.

INTRODUCTION

This paper provides estimates of the employment and fiscal effects of Michigan's MEGA program. MEGA is an acronym for Michigan Economic Growth Authority. The MEGA program is a tax credit program that provides refundable tax credits to businesses for locating, expanding, or retaining jobs in Michigan.

The rationale for preparing this paper is that there has been no rigorous independent analysis of the net impacts of MEGA. There have been some recent independent analyses of MEGA (Anderson et al. 2010; LaFaive and Hohman 2009); however, we believe that these analyses of MEGA are flawed. The text of this report presents our analysis. Two appendices explain why these other analyses are flawed.

Obviously this paper's estimates are relevant to Michigan policymakers. Critics of MEGA claim that the program is expensive and ineffective—as evidenced by the state's declining economy—and thus should not be continued due to the state's ongoing budget crisis. Indeed, MEGA's costs are increasing. MEGA cost over $114 million for 2007, the last year for which we have complete records of the program's costs. In addition, MEGA obviously has been insufficient to solve the Michigan economy's problems, as the state's economy has consistently underperformed relative to the nation's in recent years. Furthermore, the critics are right that with Michigan's troubled budgetary situation, all programs, including MEGA, should be carefully examined to see if they should be continued as is, reformed, or terminated. Do MEGA's benefits exceed its costs? How could its benefit/cost ratio be increased?

But evaluation evidence on MEGA also has national importance. MEGA contains several well-considered components that address some criticisms made against previous economic development incentive programs. MEGA tax credits are tied to the number and wage rates of jobs actually created by employers. MEGA credits are awarded after an econometric analysis that considers the economic and fiscal effects of the prospective credits for the state. Furthermore, given Michigan's well-developed manufacturing base and high wages, any jobs created by programs such as MEGA are likely to have larger than average multiplier effects. Finally, Michigan's economic woes mean that any jobs created by MEGA in Michigan are likely to have high economic and social benefits. In short, if a tax credit program such as MEGA cannot provide benefits greater than its costs in Michigan, then it is unlikely that other tax credit programs in other states will pass a benefit-cost test.

The paper concludes that MEGA passes a benefit-cost test. MEGA may or may not have a positive net fiscal impact; however, it does have a sizable job creation impact relative to its net costs.

Nevertheless, the evidence for our conclusion is inferred from other business location studies rather than from direct estimates of the causal effects of MEGA. If MEGA's effects are similar to those of state and local business taxes in other studies, it is likely that MEGA produces a considerable number of jobs at a relatively low cost per job, along with a sizable fiscal benefit. It is even conceivable that MEGA's fiscal benefits are sufficient that the program pays for itself.

These conclusions are sensitive to the specific assumptions we make about what percentage of the jobs subsidized by MEGA are actually induced by MEGA, and about what are the multiplier effects of MEGA on the Michigan economy. This sensitivity implies that relatively modest changes in the program's effectiveness in tipping business decisions or the program's

choice of projects might dramatically change the benefit-cost ratio. Furthermore, this sensitivity also implies that differently designed tax credit incentives, in state settings less favorable for incentive success than Michigan, may not have net benefits.

POTENTIAL BENEFITS AND COSTS OF TAX INCENTIVES FOR STATE ECONOMIC DEVELOPMENT

State and local governments probably devote over $20 billion per year to discretionary tax incentives to encourage business growth (Bartik 2001, p. 251).[1] What benefits might justify this sizable tax expenditure? The potential benefits of any jobs created by such programs are primarily of two types. First, any job creation due to these tax incentives would provide state residents with sizable labor market benefits. State job creation would help state residents by increasing the employment-to-population rate, both in the short run and in the long run. State job creation would also boost the occupational attainment of state residents, allowing residents to move up to higher-paying jobs. Second, any job creation and income creation due to the incentives may provide state residents with fiscal benefits. Tax revenue for state and local governments may grow by more than the public service costs associated with additional jobs and population. These fiscal benefits would allow either tax cuts or public service enhancements.

Some policymakers discuss tax incentives as if the incentives' main purpose is to make money for state and local governments. But research suggests that the labor market benefits of incentives are likely to be greater than the fiscal benefits. For example, one study (Bartik 2005)

[1] Some researchers give higher numbers, as much as $50 billion per year (Peters and Fisher 2002). However, such larger numbers also include many business tax credits that businesses receive as an entitlement as part of the tax code. We are restricting our attention to business incentives for economic development that can potentially be awarded with at least some discretion or selectivity.

concludes that plausible earnings benefits from incentives are more than five times greater than plausible fiscal benefits.

Therefore, tax incentive programs that do create jobs can make sense even if they don't make money for the state or local government. The question is whether the social benefits from the job creation exceed the costs of the job creation.

The social benefits of job creation are likely to be large. Analysis by Bartik (2006) implies that the present value of the earnings benefits for state residents from the permanent creation of one job are around half a million dollars. Of course, not all jobs created may be permanent, which lowers the benefits of job creation. But half of these earnings benefits occur in the first 10 years after a job is created. The estimated effects of job creation on employment-to-population ratios and occupational upgrading are sufficient to provide extra earnings for state residents in the range of between $22,000 and $34,000 per year during these first 10 years. It is important to recognize that these earnings benefits go well beyond the extra earnings of the state resident who does get the newly created job: benefits also go to state residents who are able to move up to better paying jobs when the labor market tightens.[2]

The costs of tax incentives are also potentially large. It is true that typical tax incentives are modest in size. The data indicate that the typical economic development incentive package might provide tax credits or deductions worth about $1,189 per job per year (in 2009 dollars) for about a 10-year period (Bartik 2006; Peters and Fisher 2002). But not all the jobs subsidized by incentives will actually be induced by the incentive. Many of the subsidized jobs would have been created in the state without the incentives. Bartik (2006) concludes that the typical incentive

[2] This assumes that there are no opportunity costs or offsets from reduced leisure as employment rates increase. Although there may be some costs from reduced leisure, there may also be considerable social gains from employment. Empirical evidence suggests that when unemployment is high, many individuals place a high social

package is only decisive 4 percent of the time; that is, 96 percent of the jobs would have been created anyway. Therefore the estimated social costs of incentives depend upon their effectiveness—i.e., the actual jobs created and not the often far greater number of jobs subsidized.

DESCRIPTION OF MEGA

The MEGA program was created in 1995. MEGA's basic concept is to provide discretionary tax credits to employers that create new jobs in Michigan, or retain jobs that would otherwise be lost. The credit amount is based in part on the personal income tax revenues for the workers associated with those new or retained jobs.[3] Credits can be provided for up to 20 years. The credits are refundable against the state business tax; that is, if the credit amount exceeds the business's tax liability, the business receives a cash payment from the state government. Credits are not an entitlement going to all eligible businesses, but rather are awarded with some potential discretion by a state board.[4] The Michigan Economic Development Corporation (MEDC), the state's economic development agency, runs MEGA and regards it as one of the state's key economic development programs.

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value on employment, and that this social value is sufficient that the social benefits of extra employment may even exceed the associated earnings (Blanchflower and Oswald 2004; Frey and Stutzer 2002).

[3] The credit is sometimes above the personal income tax revenues of the workers at the new or retained jobs. For example, in some cases the credit is equal to the income tax rate applied to total salaries and wages plus employer health care benefits, which would not be taxed under the Michigan income tax. In addition, for high-tech and high-wage MEGA projects, the credit rate can be twice the personal income tax rate for the first three years. Finally, in earlier years there also were other business tax credits that were part of MEGA.

[4] Although there is legally complete discretion, there are some unknowns over how much selectivity MEDC in practice exercises in awarding MEGA credits. The issue is not so much the MEGA board's selectivity, as one might expect most of the selectivity to be exercised at earlier stages of the project by MEDC staff. The issue is how many companies expressed an interest in getting MEGA credits but at some stage were discouraged or turned down by MEDC staff. This is difficult to ascertain. As will be outlined later in this paper, there are potential gains to greater selectivity in the MEGA program.

Eligibility for MEGA credits is restricted to industries that are thought to be part of the state's "export base" (industries that primarily sell their goods or services to nonstate residents, or that compete with businesses outside the state that sell goods or services to state residents). Retail businesses are generally excluded from MEGA. MEGA-eligible industries include manufacturing, mining, research and development, wholesale trade, office operations, and some tourism projects.

The program has some minimum job creation or retention requirements for a project to be eligible for consideration. These minimum job creation or retention requirements are relaxed for projects in rural areas, projects in areas that are designated as distressed by state government, and projects that meet criteria for being high tech or high wage. For businesses with existing operations in Michigan, the program also imposes requirements that the business maintain its base employment outside of the subsidized project.

The credit award can be more generous for businesses that are high tech or high wage. Credits for retention projects also require that businesses make a minimum investment per retained job, with the credit amount tied to that investment per job.

The MEGA program's discretion in awarding credits allows it to consider a wide variety of factors related to the project's benefits and costs. The MEGA program is required to gather evidence supporting the case that the project needed the credit in order to be viable in Michigan, although how strictly this requirement is worded has varied over the course of the program. In addition, prior to awarding the credit, the state does an econometric analysis to show that the project will have a net positive impact on state revenues, considering both the credit costs and state tax revenue generated, and assuming that the project was induced by the credit.

The MEGA program has always operated with annual limits on the number of projects of different types that can be approved, or in some cases the number of "project years" of credits that can be approved.[5] More recently, the legislature has imposed some restrictions on the additional prospective first-year costs of MEGA credits that can be approved in any year.

DISTINCTIVE FEATURES OF THE MEGA PROGRAM

Compared to most economic development programs among the 50 states, the MEGA program is an extremely generous program. This single program provides a tax credit whose annual value per job-year, over the life of the program, has averaged $2,188.[6] As mentioned above, the average across the leading industrial states of the annual per-job value of all incentives is $1,189. Thus, MEGA alone has almost twice the value of the entire package of state and local economic development incentives offered in a typical state.[7] This large incentive is provided for a time period that has averaged 15.74 years over the life of the program, although the incentive period has been shortened in recent years.[8]

The MEGA program has included a focus on the traditional manufacturing strengths of Michigan. Over the life of the program, about 49 percent of the credits have been in the motor-vehicle and motor-vehicle-parts industries, and 31 percent in other manufacturing industries.[9] The remaining 20 percent of credits span a wide variety of export-based industries, including

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[5] It is unclear how restrictive these limits have been.

[6] Authors' calculation, in 2009 dollars, using data provided by MEDC on actual credits awarded and actual new or retained jobs that are associated with credits, from 1996 to 2007, and with the average calculated weighted by job-years.

[7] Our calculations of MEGA's costs are simply for the MEGA program by itself. MEGA credits are often accompanied by other incentives, such as local property tax abatements.

[8] Authors' calculations using program data from 1996 to 2007, and with the length of program weighted by job-years for subsidized new or retained jobs.

warehousing and wholesale trade, tourism-related industries, professional and technical services, and telecommunications.

Because of this focus of the program on manufacturing, and given the high wages in Michigan manufacturing and the strong manufacturing supplier base in Michigan, the MEGA program tends to go to projects that have high wages and high multiplier effects on the Michigan economy. Figures from MEDC suggest that the average annual wage in MEGA projects is $72,130.[10] Simulations done using the Upjohn Institute's REMI model for this paper suggest that the multiplier effects of the direct job creation by MEGA, ignoring the costs of financing this job creation, have grown over time, reaching 3.88 in 2007.[11] (The short-run multiplier of the program is less. The MEGA multiplier was 2.12 in 1997 and gradually grew, first exceeding 3.00 in 2004 at 3.22.) Such high multipliers tend to be unusual in realistic regional econometric analyses done in the United States.

The limits on the numbers of MEGA projects have sometimes forced the program to be selective. MEGA projects are required to demonstrate a positive state fiscal impact. This requirement implicitly encourages projects to be high-wage and have strong supplier links, as such projects are more likely to have higher multiplier effects and generate more state income, which will increase projected state revenues.

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[9] Authors' calculations using MEDC data. Most industry codes were assigned by MEDC. For the few cases in which such industry codes were not assigned by MEDC, the authors assigned the industry code based on a project description.

[10] In 2009 dollars. The calculated numbers are based on MEDC figures on nominal weekly wages for each project. The averages are weighted by job-years for credited new or retained jobs.

[11] The Institute's REMI (Regional Economic Models Inc.) model is the same computerized, general equilibrium forecasting model used by MEDC to estimate the impact of its MEGA projects. It is a highly regarded economic impact model that has been carefully peer-reviewed in academic journals.

WHAT WE DID TO ANALYZE MEGA

We estimated the MEGA program's economic and fiscal impacts on the Michigan economy for each year from 1996 to 2007. Our estimates rely on the research literature in economics. The research literature we relied on includes the research consensus on how tax credits affect business location, expansion and retention decisions, research on likely multiplier effects in Michigan of job creation and government spending, and research on how changes in Michigan's economy affect government revenue and spending. We tried to adopt conservative assumptions of MEGA's effects which are likely to understate MEGA's impacts.

We obtained data from the MEDC on the actual MEGA credits paid, and the job creation and retention figures on which these credits are based, for each MEGA project for each tax year from 1996 to the present. Based on conversations with MEGA staff, there is usually about a one-year lag in projects claiming credits, although it is sometimes longer. Thus, the record provided on MEGA credits and jobs created or retained is largely complete through 2007, but not for subsequent years. As a result, all of this paper's analysis is for the period with near-complete information on MEGA activities, the period from 1996 to 2007. Furthermore, although the credited jobs appear in the tax year associated with those jobs, the state tax expenditure for those jobs typically is incurred about a year later.[12]

[12] From looking at the MEDC data on MEGA, it appears that the average lag in paying out MEGA credits probably exceeds one year, so our assumption probably overstates the negative impact of paying for the MEGA credits with reduced government spending, by moving up when the MEGA credit bill is paid compared to reality. Of course, the need to pay for the MEGA credits would have somewhat greater negative effects if we instead assumed that MEGA credits were paid out in the tax year for which the credits were rewarded. However, this is not what actually occurs. Furthermore, this increased negative effect would be slight. For example, for 2007, we assume that what must be paid for in that year is the $84 million in credits for the jobs subsidized in 2006. The job credits incurred in 2007 totaled $114 million. Using the $114 million figure would increase the negative effect of paying for MEGA by about 36 percent, since 36 percent = (114 − 84) ÷ 84. But these negative effects are slight. For example, for 2007, the gross job creation effects for MEGA are 19,900 jobs, and the offset from reduced government spending is 1,900 jobs, for net job creation of 18,000 jobs (see Table 1). Increasing this offset by 36 percent would not much alter net job creation.

We simulated the effects of the MEGA program using the Upjohn Institute's version of the REMI model. The REMI model is a well-respected regional econometric model that has been widely documented in the academic research literature (Treyz 1993; Treyz et al. 1992).

We simulated the economic and fiscal effects of the MEGA program both by simulating the effects of any jobs created and by simulating the effects of how the MEGA program's credits are financed. It is critical to a proper analysis of the net economic effects of any government policy, program, or project to consider the complete effects of all aspects of the project, not just the aspects of the project that have benefits.

To derive the final simulation, we first did two preliminary simulations. First, we simulated the positive effects on the Michigan economy if 100 percent of the MEGA jobs were in fact created by MEGA. This simulation used information on actual new or retained jobs associated with MEGA by year and by the 70 REMI industries. Second, we simulated the negative effects on the Michigan economy of reducing government spending by the costs of the MEGA credits by year.[13] (As noted above, these costs are typically lagged about one year from the tax year for which the credits are awarded.) A reduction in government spending is the natural consequences of MEGA credits, holding tax policy constant. The REMI model structure means that the negative economic effects of financing through reduced government spending will

[13] One of the peculiarities of the REMI model is that it only permits alternative simulations of the future, and not of the past. Therefore, we had to estimate the historical impact of MEGA from 1996 to 2007 by simulating what impact similar changes in jobs and government spending would have in a simulated future from 2010 to 2021. We used the actual MEDC figures on MEGA job creation by industry and costs for each year from 1996 to 2007, but assumed these changes in jobs and government spending occurred in the years 2010 to 2021. The REMI model then generated net impacts on employment, population, and real personal income for each year from 2010 to 2021. We then assumed that these same impacts on employment, population, and real personal income would occur each year from 1996 to 2007, if it were possible to directly do historical simulations with the REMI model. This method of simulating historical impacts will be accurate if shocks to jobs by industry and real government spending have similar multiplier effects in the 1996-to-2007 period as they are projected to have by REMI in the 2010-to-2021 period. If anything, this procedure is likely to understate the multiplier effects of MEGA-induced jobs, as it seems likely that due to globalization the state's manufacturers (including autos), supplier linkages, and wages have declined from the 1996–2007 history period to the 2010–2021 simulation period of the REMI model.

be solely due to demand effects. Given the modest amounts of funds involved, it may be realistic to imagine that such spending reductions could be achieved through spending reforms that did not diminish public service quality appreciably over the 11-year simulation period. If public service quality was appreciably reduced, then the negative effects of government spending reduction could be much greater.[14]

The net effects of MEGA on the state economy are then assumed to be equal to some proportion k of the direct effects of the MEGA-credited jobs, plus the negative effects of reduced government spending. The proportion k is interpreted as the proportion of MEGA-subsidized jobs that would not have existed in Michigan but for the MEGA program. That is, if the program had never existed, we assumed that the proportion $(1 - k)$ of MEGA-subsidized jobs would have been created or retained in Michigan anyway, whereas the proportion k of MEGA-subsidized jobs exist in Michigan because of the program. We will discuss further below how we chose this proportion k.

It should be noted that the job creation impact scenario we used for the REMI model incorporated what REMI calls the "firm" method of estimating impacts. This method allows for some shock to employment in some firms in a state industry to lead to some substitution effects on other firms. That is, the REMI model incorporates the assumption that even if some MEGA jobs were actually induced by MEGA, some proportion of these induced jobs would reduce jobs in other state firms that compete with the MEGA-assisted firms in the same industries.

In addition, we should note that MEGA-credited jobs do not include all jobs related to MEGA, just jobs that receive credits under MEGA. For example, if a business in some year falls

[14] For example, research shows that high quality preschool education has considerable economic development benefits (Bartik 2006). Therefore, if the financing were accomplished through reductions in preschool spending, the negative effects of government spending reduction would be much greater.

below the minimum threshold for new or retained jobs, or for base jobs outside the project, it will not receive MEGA credits for that tax year. However, it still could be the case that some of the jobs at that firm could be due to MEGA. In addition, after a MEGA credit runs out, a large proportion of the jobs at that business would be expected to persist for some time. However, none of these persistent jobs are counted in this analysis. This analysis only incorporates MEGA jobs as a possible effect of the MEGA program if MEGA is still awarding credits for the jobs in that year. By ignoring MEGA-associated jobs that are no longer subsidized by MEGA, we probably understate the effects of the MEGA program.[15]

We used the outputs of the REMI model and previous research to compute possible fiscal benefits of MEGA. Our simulations resulted in predicted percentage effects on state personal income and population by year for each year from 1996 to 2007. These predictions are, of course, conditional on what assumptions we made about what proportion k of MEGA-credited jobs were actually created by MEGA. We made assumptions about how shocks to personal income and population would affect various categories of state and local revenue and spending. Some revenue categories were assumed to respond to income, such as individual income taxes, sales taxes, and corporate income taxes. Elasticities of response of these revenue categories were based on the research literature.[16] Most other categories of revenue and spending were assumed to respond by the same percentage as the percentage change in state population.[17] One important

[15] Note that if a company does not provide all originally promised jobs, but does provide the minimum required jobs, we only count the jobs that were actually provided MEGA credits. Jobs that were promised, but that were not created and therefore did not receive a MEGA credit, are not included in our analysis.

[16] For the personal income tax and the sales tax, we used long-run elasticities (adjusted in the case of the income tax) as estimated by Bruce, Fox, and Tuttle (2006) for Michigan. The long-run elasticity is 1.40 for the personal income tax and 0.772 for the sales tax. For the main Michigan state business tax, now called the Michigan Business Tax and formerly the Single Business Tax, we assumed an elasticity with respect to personal income of 1.00.

[17] The property tax might be thought to respond to income rather than population, but this analysis needs to reflect property tax limitations due to Michigan's Headlee Amendment to the state constitution. Under this provision, any increase in a local area's tax base due to increases in assessments requires a readjustment of the property tax rate

exception is that these shocks to labor demand in a state were assumed to not have any effects, positive or negative, on categories of state spending related to welfare spending.[18] This is likely to understate the fiscal benefits of increasing labor demand in a state, as one might expect increases in state employment-to-population ratios and wage rates to actually reduce state welfare spending.

The amount in each revenue and spending category was based on data from the U.S. Census Bureau's Census of Governments on total Michigan state and local government general own-source revenue, and direct general expenditure, for each year from 1996 to the present.[19] For each year, using these revenue and expenditure figures by categories, we estimated how net state and local government revenue and expenditure would respond to a 1 percent shock to personal income, and a 1 percent shock to state population. Our simulations of the REMI model yielded percentage shocks to personal income and population for each year, which were then multiplied by our fiscal impact parameters to generate a predicted net fiscal benefit or cost for each year.[20]

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to yield the same real revenue, except for increases in assessments due to new development. We assumed that the percentage increase in property tax revenues due to new development can be approximated as being equal to the percentage increase in Michigan population.

[18] The "welfare" categories are public welfare, health spending (but not hospital spending), and employment security administration.

[19] State-specific data are not available from the Census of Governments for 2001 and 2003. The dollar figures for these years for effects of shocks to personal income and population are calculated by calculating the effects as a percentage of state personal income for the adjacent years (2000 and 2002 for 2001; 2002 and 2004 for 2003), and then interpolating these effects as a percentage of personal income for 2001 and 2003, and finally multiplying by Michigan state personal income for 2001 and 2003 to get dollar effects.

[20] A reader might ask, "What happens to these fiscal benefits or costs?" The REMI model treats fiscal variables endogenously and generally not explicitly. State and local employment and output is allowed to endogenously increase; however, tax rates are not explicitly entered into the model. Because the REMI model is estimated over pooled time-series cross-section data on U.S. states, the model implicitly assumes that fiscal variables adjust as they have historically with economic changes. As state and local governments have balanced budget requirements, the model is thereby implicitly assuming that state and local budgets remain balanced as revenues and expenditures adjust. Therefore, the model is assuming that state and local governments respond to any economic shock as they historically have done in adjusting expenditures or taxes. These adjustments are implicitly reflected in the final economic effects that are estimated. In other words, the model already implicitly assumes that any fiscal benefit will be used as such benefits have been used historically.

We now return to the critical issue: what value of k, the proportion of MEGA-credited jobs that are actually due to MEGA, should be assumed to be valid? We first picked a value of k that would yield an average of zero fiscal effects over the 1996-to-2007 period. This was calculated as the value of k that makes the present value of real fiscal effects summed over these years equal to zero. This turns out to be 16.8 percent. In other words, of the MEGA credits actually rewarded, only about one in six needs to be decisive, a batting average of 0.168, for the MEGA program to have had zero net fiscal costs to the state of Michigan for the 1996-to-2007 period.

It turns out that because multiplier effects of job creation grow over time, this 0.168 batting average actually yields a surplus of $33 million for state and local governments in 2007. The program loses money in some of its earlier years. But as its job creation effects grow, it begins to make money. This 0.168 batting average is picked so that the net present value of the fiscal surplus over the entire 1996–2007 period is zero. This break-even batting average could be updated as data from additional years is obtained. If MEGA job creation and fiscal effects stay stable or grow after 2007, then the break-even batting average over the life of the program will drop below 0.168. We do not calculate such scenarios because they require speculative projections of the program's experience after 2007.

But what value of k is plausible based on empirical evidence on taxes and tax incentives? We have no good direct evidence on the causal effects of MEGA by itself. Such direct evidence will be hard to come by. It is obviously impossible to find a control group of businesses in Michigan. Comparisons of Michigan businesses with non-Michigan businesses need to take account of all of the many factors that differ across states, not just MEGA. Therefore, a good

analysis of the effects of MEGA really needs to be part of a more general analysis of how state taxes and other costs affect business location.

The most comprehensive review of the research evidence on state and local business taxes and business location decisions remains the review in Chapter 2 of Bartik (1991). This review attempted to summarize what a wide variety of studies implied for the long-run elasticity of state and local business activity with respect to total state and local business taxes: that is, if *all* state and local business taxes were cut by 10 percent, what would be the long-term resulting increase in the state's business activity? Wasylenko (1997) argues, we think persuasively, that a closer look at the studies reviewed in Bartik suggests that the most plausible estimate of this long-run elasticity is −0.20. That is, Wasylenko argues that if all state and local business taxes are lowered by 10 percent, the long-run increase in state business activity will be 2 percent.

As outlined in Bartik (2006), these elasticity estimates can be used to estimate how individual business location or expansion projects are likely to respond to incentives. This estimation assumes that an incentive dollar is worth just the same as a dollar of lower taxes. Furthermore, this estimation assumes that the responsiveness of the number of induced projects to lower taxes or extra incentives will represent the long-run response of business to lower state and local taxes, as such projects represent the marginal, flexible aspect of business capital.

Based on MEGA's average magnitude of incentives per job per year and average length, this extrapolation of the consensus elasticity of −0.2 suggests that the MEGA program should have a batting average of 0.082, or 8.2 percent.[21] It is important to understand what this value for *k* represents. This batting average is derived from a literature on how businesses respond to state

[21] This batting average of 8 percent is about twice the percentage of location decisions that are believed to be affected by the average state and local incentive package. That percentage, as noted above, is estimated to be 4 percent (Bartik 2006). MEGA is estimated to tip twice as many location decisions as the average incentive package

and local business taxes that do not make any attempt to be selective among individual businesses. Therefore, this 0.082 batting average represents what proportion of MEGA projects would be induced by MEGA if the program exerts *zero* selectivity in choosing projects in which MEGA is more likely to be decisive. This is the batting average of MEGA if we can view its choice of projects as being essentially random among all potentially eligible projects, or at least completely unselective with respect to the odds of tipping the project's location. If the MEGA program does a good job of using its selectivity—for example by selecting projects in which it is more likely to tip the location decision towards Michigan—it can improve upon this batting average. Therefore, it seems reasonable to view the 0.082 batting average as providing a lower bound to the plausible benefits of MEGA.

Why is the thus-estimated batting average only 0.082? This estimated batting average is so low because, from the perspective of business decision-making, a subsidy of $2,188 per job is not that big a subsidy. Therefore, if the subsidy is essentially handed out randomly to eligible businesses, we would expect the subsidy to have only modest effects on business location decisions.

However, even with such a modest MEGA batting average, the program would make back a considerable amount of money for state and local governments. For example, in 2007, when the gross cost of the program was $83.6 million, even if the program's batting average is only 0.082, the program's "fiscal benefits" (revenue generated minus service costs generated, for both state and local government) are $55.8 million, offsetting about two-thirds of the gross cost. The net cost is only $28.8 million.

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because MEGA is about twice as big in its annual subsidy per job as the average total state and local incentive package.

But this discussion so far is proceeding as if the only purpose of these programs is to make money for state and local governments in Michigan, which is far from the case. In fact, the main social benefit expected from such programs is in creating jobs, and thereby raising employment rates and occupational attainment for Michigan residents.

To look at this, we need to look at all years and a wider range of effects. We consider in some detail two possible batting averages. First, we consider the 0.082 batting average: the program has no selectivity effects beyond what would be obtained from randomly choosing projects among eligible firms. Second, we examine the 0.168 batting average, or what is needed for the program to have a zero net present value of fiscal benefits or costs averaged over the entire 1996-to-2007 period. This is arguably a feasible batting average. It is not inconceivable that wise selectivity in picking MEGA projects might increase the percentage of "decisive" MEGA credit awards from 8.2 percent to 16.8 percent, which only requires improving on chance in 8.6 percent of all projects, or less than 1 in 11.

Table 1 provides year-by-year estimates under these two scenarios. What are the main points that are apparent in Table 1? We list five:

1) MEGA causes considerable job creation, which grows over time. By 2007, these two scenarios yield MEGA job creation of between 18,000 and 39,000 jobs.

2) MEGA is relatively cheap per job created. As noted above, if we assume a 0.168 batting average, the MEGA program has zero net present value of fiscal costs summed over the entire 1996–2007 period. Under this scenario the MEGA program yields a net fiscal surplus of $33 million in 2007. This positive fiscal impact is for 2007 alone; it offsets negative fiscal effects for previous years.

Table 1 Annual Net Effects of the MEGA Program on Michigan's Economy, under Two Scenarios

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Subsidized MEGA jobs (000s)	0.7	1.8	3.0	5.8	7.5	9.8	11.1	13.0	21.0	31.1	40.8	62.1
Gross MEGA credit costs ($M)		1.0	3.0	6.0	10.3	13.3	19.1	21.9	28.5	44.3	65.4	83.6
Net effects if 8.2% of MEGA jobs are induced by MEGA												
Net job effects (000s)	0.1	0.3	0.5	1.0	1.2	1.7	1.9	2.4	4.9	7.7	10.4	18.0
% net job effects (out of total MI jobs)	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.09	0.14	0.19	0.33
Net fiscal effects ($M)	0.2	−0.2	−1.7	−3.3	−7.0	−8.8	−14.7	−16.7	−16.6	−23.2	−34.9	−28.8
Net fiscal effects per job created ($)	3,440	−863	−4,515	−4,278	−7,230	−6,292	−9,156	−8,255	−3,863	−3,331	−3,573	−1,660
Net effects if 16.8% of MEGA jobs are induced by MEGA												
Net job effects (000s)	0.1	0.6	1.1	2.2	2.8	3.8	4.4	5.4	10.7	16.7	22.8	38.7
% net job effects (out of total MI jobs)	0.00	0.01	0.02	0.04	0.05	0.07	0.08	0.10	0.19	0.30	0.42	0.71
Net fiscal effects ($M)	0.4	0.7	−0.2	−0.1	−2.9	−3.3	−9.1	−10.2	−2.8	1.3	0.7	33.0

NOTE: The source for this table is the authors' calculations, as described in the text. Each column shows figures only for that year; that is, the numbers are not cumulative: these are costs, jobs created, and fiscal effects for that year only. These effects are based on data on MEGA provided by MEDC, and simulations performed using this data by the Upjohn Institute, using our own adapted version of the REMI model. MEGA credit costs are assumed to lag one year behind the tax year for which they are incurred. MEDC-subsidized jobs and credit costs reflect all MEGA project data as provided by MEDC. Net effects reflect a downward adjustment because the MEGA credit is only assumed to be decisive for some percentage less than 100 percent (8.2 percent and 16.8 percent) of all jobs receiving a subsidy. As described in the text of this paper, 8.2 percent reflects what we would expect from the business location and state taxes literature if MEGA credits do not reflect any special selectivity to projects in which the credit is more likely to be decisive. The 16.8 percent is the required percentage if the MEGA program is to have zero net present value of fiscal costs averaged over the 1996–2007 period. Net job effects are increased due to multiplier effects of these induced jobs. Net effects also reflect negative effects upon state economy of financing the MEGA credit program by reduced state and local government spending. The percentage effects on jobs divides net jobs created by total jobs in Michigan, defined by REMI as all wage, salary, and self-employed workers including farm. Percentage effects mean that 0.71 percent = 71/100ths of 1 percent. Net fiscal effects are positive if benefits, negative if costs. Net fiscal effects include costs of MEGA credits, plus the effects on total state and local government tax revenue and required government spending in Michigan due to economic effects of MEGA jobs and MEGA credits on Michigan personal income and population, as described in the text of this paper. Net fiscal costs per job are derived by dividing net fiscal effects by net jobs created; a negative figure indicates a net cost.

But even with a 0.082 batting average, the net fiscal cost over the entire 1996–2007 time period averages $3,490 per job-year. The cost per job-year is never more than $10,000 over this time period and declines to less than $2,000 per job-year in 2007.

Under almost any reasonable social valuation of the benefits of one job-year, a fiscal cost of only $3,490 per job-year seems well worth undertaking for such benefits.

3) MEGA's effects are modest relative to the size of the Michigan economy. But this largely reflects that the MEGA program's scale is modest relative to the size of the Michigan economy.

The MEGA program is estimated under the two scenarios to boost Michigan employment in 2007 by one-third to two-thirds of 1 percent. This is a modest effect. Obviously such an effect is insufficient to come close to offsetting the adverse effects on Michigan's economy due to the Great Recession or the problems of the Detroit Three auto companies.

But the MEGA program itself is small. The program's gross cost in 2007 was only $83 million. Annual private-sector gross state product, the value of all that the private sector produces in Michigan, was $337 billion in 2007. The MEGA program was only 0.03 percent of total private GSP in 2007. What is surprising is not the modest size of MEGA's effects on the Michigan economy, but rather that a program that is only 0.03 percent of total private output could increase Michigan employment by one-thirds to two-thirds of 1 percent.

4) There are potentially enormous returns to improving the selectivity of the MEGA program or boosting benefits per credited job. As outlined above, if we could boost the program's batting average from 0.082 to 0.168, the program would change from costing $29 million in 2007 to generating $33 million in fiscal surplus. Similar benefits could be obtained if we increase benefits per job. This would occur if we picked projects with higher multiplier effects. To the extent to which the program's selectivity or program design can choose projects with higher multipliers, higher wages, or greater supplier links, the MEGA program will tend to have greater benefits.[22]

[22] Another possibility is greater selectivity with respect to which projects are most likely to promote new Michigan clusters of economic activity. However, this raises some difficult issues about whether the right new clusters can be identified by state policymakers. These issues go beyond the scope of the current paper.

5) The MEGA program's net benefits tend to improve over time. Multiplier effects take time to get underway.

CONCLUSION

MEGA has had net benefits for the Michigan economy. Our lower-bound assumptions about MEGA's impact indicate that, after one considers MEGA's fiscal benefits, it becomes clear that MEGA has created jobs over the 1996–2007 period at an average cost of less than $4,000 per year of employment created. The economic benefits to Michigan's residents of an extra year of employment are almost surely far greater than $4,000. As discussed above, we believe it reasonable that the economic benefits of an extra year of employment for Michigan's residents are over $20,000 per job-year. Therefore, MEGA has a ratio of economic development benefits to costs of at least 5 to 1. This ratio is derived from conservative assumptions that understate MEGA's benefits.

MEGA's net economic benefits are attributable to the program's emphasis on export-base, high-wage industries with strong local supplier links in a Michigan economy that has historical strengths in manufacturing. The resulting high-multiplier effects mean that even modest effects on business location decisions—i.e., even a modest batting average—can cause the MEGA program to produce jobs at a low net cost per job created.

The MEGA program could be improved with some reforms. There are big returns to better targeting of the MEGA program at businesses with higher wages and stronger supplier links, or to trying to better target the MEGA program at affecting business decisions on the margin. More targeting of high-multiplier businesses is easier to implement than more targeting

of business decisions in which MEGA is more likely to tip the balance. MEGA's multiplier effects can be readily measured using publicly available data. Whether MEGA is needed to tip the balance in some business decisions in part can only be determined with insider business knowledge, which is hard to come by. But the MEGA program could readily adopt procedures or formulas that either select more high-multiplier businesses or provide greater MEGA credits for higher-multiplier businesses.

Appendix A

Using County Evidence to Estimate the Effects of MEGA

Two publications by Michael LaFaive and his colleagues at the Mackinac Center have used cross-county variations in MEGA to estimate the effects of MEGA (LaFaive and Hicks 2005; LaFaive and Hohman 2009). The basic idea is to see if, after controlling for other factors, counties in Michigan that have received more MEGA projects have done better economically. The conclusion of these reports is that heavy county users of MEGA do not fare better. In fact, in their 2009 report, LaFaive and Hohman state that $1 million extra in MEGA manufacturing tax credits awarded in a county was associated with the loss of 95 manufacturing jobs.

The problem is that counties with low MEGA usage are not a valid control group for determining the relative effects of MEGA in counties with high MEGA usage. The amount of MEGA credits in a county is not randomly assigned. To put it another way: every county in Michigan is equally legally eligible for MEGA, so there is no variation in the MEGA "treatment" across Michigan counties.

Actual usage of MEGA across counties could vary for a number of reasons. These different causes of variation could cause diverse, large, and unpredictable biases in using county data to estimate the causal effects of MEGA.

For example, if MEGA credits were randomly assigned among all growing firms, we might expect more MEGA credits in growing counties. If this were the main process determining MEGA credits by county, we might expect MEGA credits by county to be positively associated with county growth even if MEGA has no positive effects.

Alternatively, MEGA might be most aggressively used in counties in which more businesses face economic challenges. If this were the case, then MEGA credits by county will tend to be negatively correlated with county growth. MEGA will look as if it is destroying jobs even if this is not MEGA's true effect.

LaFaive and Hicks (2005) use instrumental variables to deal with the possible endogeneity of the MEGA credit variable. However, in our view, the instruments, which are mostly lagged dependent and independent variables, and variables reflecting MEGA approval of credits, are not convincing instruments. Ideal instruments would provide exogenous variation in MEGA availability that is uncorrelated with local growth trends, and we don't believe the chosen instruments do so. (Nor are we optimistic that there are instruments that will solve this problem.) LaFaive and Hohman (2009) control for local growth trends with predicted growth based on industrial mix. This addresses a portion of the problem. However, it is well known in the regional economics literature that industrial mix, while it is important, only explains a small proportion of local growth.

Appendix B

Why Do the Estimated Effects in This Report Differ from Estimates in a Recent Report by the Anderson Economic Group?

We attempted to compare our results with the results from a March 2010 report completed by the Anderson Economic Group (Anderson et al. 2010). In the part of their report that analyzed MEGA, they reached a number of conclusions that imply that the MEGA program as it historically has existed, prior to the 2008 reforms in the program, has cost Michigan jobs and revenue relative to the alternative policy they consider of cutting the overall state business tax. On MEGA, the AEG report states the following specific findings on page 38:

> We find that the Michigan Economic Growth Authority tax incentive program results in $44.5 million per year less in the short run (three years after abatement) in direct tax revenue in Michigan than would have been collected if the program was replaced with the alternative of an approximately revenue-neutral cut in the MBT for all businesses. This net direct tax impact is $57.9 million in tax revenue reduction by the tenth year after the incentive....We find that the State of Michigan has 8,248 fewer jobs...than it would have without [MEGA] in the short run, three years after the incentive. The impact on employment...is significantly more negative [in] the long run, ten years after the incentive.

Table 1 of the AEG report states that the "direct employment gained... by replacing [the] incentive with [a] comparably sized tax reduction" is, for the MEGA program with a "10 year time horizon," equal to 17,739.

These results for jobs seem contradictory to the results we obtained in this report. In our Table 1, we examined the effects of MEGA over its entire 1996-to-2007 history, compared to a counterfactual history in which MEGA tax credits were used to increase state and local public expenditure in Michigan. We concluded that a plausible lower bound to MEGA's effectiveness implied that MEGA, as it historically operated from 1996 to 2007 (and compared to this

counterfactual history), has increased Michigan jobs. The estimated lower-bound net job creation from MEGA is about 10,000 jobs created after 10 years (2006).[23]

We attempted to understand the reasons for the differences between our results and the AEG results. Obviously, the different results are due to different assumptions. The question is which assumptions are more reasonable.

One factor that does *not* differentiate our report from the AEG report is the relative focus on the historical MEGA program versus the current MEGA program. Both our report and the AEG report are examining the MEGA program as it historically operated, prior to the 2008 reforms (AEG report, footnote 8 on page 6, and pp. 7–8).[24]

One significant difference between the AEG report and our estimates in Table 1 is our assumed counterfactual. Our estimates in Table 1 compared the MEGA program with a counterfactual world in which the funds saved by never having MEGA were used to increase public expenditure. The AEG estimates compare MEGA's performance, as it was manifested in the period from 2000 to 2007, with a counterfactual of instead cutting the state's business tax by 10 percent.

To explore further the reasons for the differences between our results and AEG's results, we tried to perform a similar type of thought experiment to that undertaken by AEG. The main

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[23] Our fiscal results may seem more compatible with the Anderson report's results. We concluded that the MEGA program had a net fiscal cost of about $35 million after 10 years (2006), whereas AEG concluded that the net fiscal loss was $58 million after 10 years. However, this is an apples-to-oranges comparison. Our results are with a government-spending counterfactual, whereas their results are with a business-tax-cut counterfactual. As will be seen further in this appendix, when we compare MEGA with a business-tax-cut counterfactual, MEGA had generated about $30 million in fiscal benefits for the state 10 years after the historical policy was introduced (2006), compared to the business-tax-cut counterfactual (Table B.1).

[24] Furthermore, the difference between our results and AEG's results does not spring from our inclusion of data from the early days of the MEGA program. The AEG report states its belief that MEGA used to be more effective because it was more selective, and that the AEG estimates only apply to MEGA as it has operated since 2000 (AEG report, p. 38, and footnote to Table 5). However, as noted in the text, our impact estimates assume *zero*

text of our report considers what would have happened if the state of Michigan had never had the MEGA program and had used the proceeds to increase public spending. In this appendix, we consider an alternative that is similar in spirit to that used by AEG: what if, instead of having MEGA, the state of Michigan had used the same amount of resource dollars to reduce the main state business tax?

We agree with the concept stated by AEG that policy analysis should incorporate a counterfactual. AEG states upfront in its report the following:

> To truly understand the costs and benefits of a tax incentive program, we must compare it to the costs and benefits of an alternative policy. Choosing one policy means that you cannot choose the other, and both have potential costs and benefits. Comparing a program to a reasonable foregone alternative is a crucial and often neglected step in policy analysis. (p. 2) ... Failing to compare the tax incentive to an alternative policy would have the unrealistic effect of ignoring the opportunity cost of not pursuing another policy. (p. 3)

We agree completely with the principle stated by AEG that any policy analysis needs to be compared with some "reasonable" foregone alternative. In the case of policies, such as MEGA, that involve a direct loss of tax revenue, the most "reasonable" and policy-relevant alternative is an alternative policy that uses that same revenue for some other purpose. Therefore, in examining the MEGA program versus a counterfactual of cutting Michigan's business tax, we cut the business tax by exactly the revenue saved by never having had the MEGA program. AEG appears to agree in concept with this approach, as it states that "the alternative tax policy was intended to produce an approximately revenue-neutral tax change" (p. A-3). However, as we will discuss further below, we appear to disagree with AEG about what is required to produce an approximately revenue-neutral tax change.

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selectivity of the MEGA program in choosing projects in which MEGA is more likely to be decisive. If MEGA was more selective prior to 2000, then job growth by 2006 and 2007 would be higher than our lower-bound estimates.

Table B.1 shows the results. As these results illustrate, we conclude that cutting state business taxes, as a replacement for MEGA, would not come close to offsetting the jobs lost from eliminating MEGA. We estimate that in 2006, a MEGA program by itself would have increased state jobs by a little less than 12,000 jobs. The effects of instead cutting Michigan business taxes from 1996 to 2006, by a dollar amount each year exactly equal to MEGA's cost, would only generate about 2,400 jobs, about one-fifth of the jobs generated by MEGA. Over this 10-year time horizon, the net effect on the state economy of an alternative history without MEGA, with lower business tax rates because of the revenue savings, would be to reduce the number of jobs

Table B.1 Annual Effects if MEGA Had Never Existed and Had Been Replaced with Cuts in the Main State Business Tax

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Gross job effects of MEGA (000s)	0.1	0.3	0.6	1.2	1.5	2.0	2.4	2.9	5.6	8.7	11.9	19.9
% cut in State Business Tax allowed by eliminating MEGA		0.06	0.18	0.34	0.57	0.71	1.01	1.13	1.43	2.15	3.08	3.83
Gross job effects of cutting State Business Tax (000s)		0.0	0.1	0.2	0.4	0.5	0.7	0.9	1.2	1.7	2.4	3.2
Net job effects of substituting overall business tax cut for MEGA (000s)	−0.1	−0.3	−0.5	−1.0	−1.1	−1.5	−1.7	−2.0	−4.4	−7.0	−9.5	−16.7
Fiscal effects of substituting overall business tax cut for MEGA ($M)	−0.2	−0.8	−1.3	−2.7	−3.3	−4.5	−4.4	−5.1	−11.9	−21.0	−29.9	−53.7

NOTE: The source for these numbers is the authors' calculations: see Appendix B text. The gross job gains for MEGA are effects after assuming 8.2 percent effectiveness and multiplier effects, but allowing for no opportunity costs of financing MEGA. The percentage business tax cuts are percentage cuts if MEGA was eliminated, and saved funds were applied to a business tax that raised the same real amount as the Michigan Business Tax raised in fiscal year 2009. The gross job effects of cutting the state business tax are those that occur if this schedule of business tax cuts started in 1997, ignoring any opportunity costs of financing these cuts. The net effect is these gross job gains from lower overall business taxes minus the job gains from MEGA. Finally, the fiscal effects of this package are the effects on state and local revenue minus effects on state and local required public spending to maintain service quality from the package's effects on personal income and population. Negative numbers indicate net fiscal costs.

in the state by more than 9,000 in 2006.[25] In contrast, in the AEG report's 10-year time horizon, the report estimates that if the MEGA program had not existed as it historically existed from 2000 to 2007, and the state had instead cut the main state business tax, then the state would have gained more than 17,000 jobs (AEG report, Table 1, p. 9).

Table B.1 also shows the fiscal effects of this policy shift away from MEGA and towards overall business tax cuts. The policy causes fiscal costs by reducing state and local tax revenue by more than the savings in spending from lower population. For 2006, 10 years after MEGA started up, we estimate that if the MEGA program had never been created, and the revenue saved had been used to reduce the main state business tax, the state would have suffered a net fiscal loss of almost $30 million.[26] In contrast, in the AEG report's 10-year time horizon, AEG estimates that if the MEGA program had never existed as it functioned from 2000 to 2007, and instead the main state business tax had been cut, the net revenue effects for the state would be a fiscal benefit of almost $58 million.

Our estimated economic effects for across-the-board business tax cuts are derived using an adjusted version of the REMI model. We want our estimated effects of cuts in business taxes

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[25] We should also point out that an alternative counterfactual, in which MEGA is compared with a tax credit targeted at new investment or job creation, but with this counterfactual tax credit handed out as an entitlement under the tax code rather than on a discretionary basis by MEDC, raises more complex issues. An entitlement tax credit targeted at business decisions on the margin to expand or locate in Michigan is likely to compare more favorably with MEGA than is true of the across the board business tax cut used as a counterfactual in this appendix and in the AEG report. An analysis of the pros and cons of discretionary vs. entitlement tax credits targeted at business expansion or location decisions on the margin is beyond the scope of this report.

[26] How is the fiscal loss from this substitution reflected in the model? As explained in one of the text's footnotes, the REMI model treats the state and local government sector endogenously and implicitly. State and local governments adjust to this fiscal loss according to historical patterns in dealing with such economic shocks, and such historical fiscal adjustments affect the final economic adjustments estimated by the model. State and local governments presumably adjust to this fiscal loss with some combination of reduced expenditures and increased taxes, according to historical patterns. If we instead made all the fiscal adjustments by reducing the size of the business tax cut, this size would have to be reduced considerably. For example, in 2007, the originally assumed business tax cut was $83.6 million (see Table 1), the savings from never having had MEGA. If all the fiscal loss was accomplished by adjusting the business tax cut, then the business tax cut would have to be reduced by the $53.7 million fiscal loss for 2007 in Table B.1. This would reduce the size of the business tax cut by two-thirds. However,

to be consistent with our estimates of the effects of business tax credits such as MEGA. Therefore, we adjust the REMI model to be consistent with a long-run elasticity of business activity of −0.20. This requires slightly reducing the REMI model's responsiveness to business production costs, by about 16 percent.[27]

Why are our results so different from those in the AEG model? As one would expect, the results differ because of different assumptions. We believe that our assumptions are more reasonable and realistic than those made by AEG. Here are some of the crucial differences between the two analyses:

1) Choosing the counterfactual so that it is feasible. AEG compares the MEGA program with the alternative of cutting business taxes by 10 percent. But the MEGA program does not cost enough in the short run or long run to allow for a 10 percent cut in the Michigan Business Tax. For example, if the MEGA program was eliminated tomorrow, the existing MEGA contracts would still remain. The saved costs from eliminating MEGA would be negligible for a few years. After that, MEGA costs would gradually decline as existing MEGA contracts began to run out. However, given that MEGA contracts run up to 20 years, with most 7 years and more, it

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this policy shift would presumably result in counterbalancing increases in government spending or reductions in other taxes. The net economic effects of this different pattern of adjustment are likely to be slight.

[27] We estimated this adjustment factor by comparing the REMI model's default employment response to lower business costs to what we would expect based on the −0.20 research literature consensus on the business location tax elasticity. Overall state and local business taxes in Michigan are $16.8 billion. A 10 percent reduction in overall state and local business taxes would be expected, based on the research literature, to boost Michigan employment in the long run by 2 percent. A 10 percent or 1.68 billion reduction in Michigan business taxes is equivalent to a 0.497 percent reduction in Michigan business costs, based on private value-added in Michigan. Based on the adjustment factor estimated in Helms (1985), the effect after 10 years is likely to be about 61 percent of the long-run effect (see Bartik 1991, p. 236). Therefore, we imposed a 10-year elasticity of −0.122, or 61 percent of the long-run elasticity. This predicted elasticity is about 84 percent of the elasticity generated by the unadjusted REMI model. Because of this, we adjust the REMI model estimates of the effects of never having had the MEGA program, and using the proceeds for a lower overall business tax rate, downwards by 16 percent. The savings from eliminating the MEGA program for each year from 1997 to 2007 are entered into the REMI model as lower production costs. It should be noted that results would not be much different if we used the unadjusted REMI model. The gross effects of lower overall business taxes would then be about 20 percent greater. In 2007, this would increase the gross effects of cutting the state business tax by about 600 jobs, which would only very slightly change the overall results.

would take at least 10 years before most of the current MEGA costs were saved. Current MEGA costs for tax year 2007, which was the last year for which we have close to complete reporting of MEGA costs (as MEGA costs for a given tax year are mostly paid out at least a year later) were $114 million. Michigan Business Tax revenue in fiscal year 2009 was $2.260 billion (Michigan Treasury 2010). Even after 10 years, the cost savings from eliminating MEGA would be no more than $114 million ÷ $2.260 billion = 5.05 percent. And, before 10 years, the percentage tax cuts would be even less. A tax cut that only gradually ratchets up to 5 percent would clearly have effects considerably less than half as great as a 10 percent tax cut that begins immediately.

The same problem occurs when we analyze the historical impact of the MEGA program, which is the goal of both our report and the AEG report. For our analysis, we considered what would have happened if the MEGA program had not existed over the 1996-to-2007 period. As shown in Table B.1, this alternative policy only allows a business tax cut that would be equivalent to a tax cut much less than 10 percent over this entire period. MEGA was enacted in 1995. If the program had not existed, the resulting business tax cut, measured relative to the revenue raised by a tax such as the Michigan Business Tax, would have started out at only 0.06 percent and 0.18 percent in 1997 and 1998, before gradually growing to 3.83 percent as of 2007.[28]

[28] The AEG report acknowledges the existence of a "transition cost" problem for MEGA (p. 7). However, AEG does not note that the transition-cost problem means that its counterfactual 10 percent tax cut is infeasible relative to the historical MEGA program. The AEG report also argues that MEGA costs about $140 million (footnote 64 on page 31, Table A-1), that it models the MBT as a gross receipts tax, and that 10 percent of the gross receipts portion of the tax is $140 million. Its $140 million annual cost figure appears to use the FY 2008 estimate from a 2007 Michigan Department of Treasury report. However, this FY 2008 figure has since been revised downwards to $59.1 million (Michigan Department of Treasury 2008). In addition, the historical data on MEGA's annual costs, which is what is relevant here, show costs of far less than $140 million, particularly in the early days of the program (Table 1, row 2).

The AEG report also acknowledges that its procedures may involve assuming a "small" tax revenue decrease (p. A-3). However, the discrepancies between a 10 percent business tax cut and the feasible percentage tax cuts shown in Table B-1 are not small relative to the size of the MEGA program or the size of a 10 percent tax cut.

2) Assuming business tax elasticities consistent with the research literature. The tax elasticity of −0.35 assumed by AEG for the Michigan Business Tax cut is far higher than the elasticities assumed in this report (see their Table A1). The AEG assumed tax elasticity appears to be both a short-run and a long-run elasticity of Michigan industrial and commercial business activity with respect to a change in one business tax, the Michigan Business Tax.

The long-run elasticity of −0.20 assumed in our report is from a research literature that tries to estimate the responsiveness of business activity to total state and local business taxes (Wasylenko 1997; Bartik 1991). Thus, a 10 percent reduction in ALL state and local business taxes would be expected to have the long-run effect of increasing a state's business activity by 2 percent. Total state and local business taxes in Michigan in FY 2008 are estimated by Ernst and Young to be $16.8 billion (Phillips et al. 2009). The business location literature consensus thus implies that a business tax reduction of $1.68 billion, which is a 10 percent reduction, would be needed to increase Michigan business activity in the long run by 2 percent.

A $1.68 billion business tax reduction, out of total Michigan Business Tax revenue of about $2.26 billion, is a 74 percent reduction in the MBT. Assuming that a given dollar amount of business tax reduction tends to cause similar effects on business location, such a reduction in the MBT would be expected to increase Michigan's long-run business activity by about 2 percent. The implied long-run elasticity of Michigan business activity with respect to the MBT alone would be 2 percent ÷ −74 percent, which equals −0.027. This is less than one-tenth of the long-run elasticity assumed in the AEG report.[29]

[29] The AEG report refers to a research literature that maintains that the "tax-price elasticity" of business employment is between −0.1 and −0.6 (AEG report, footnote 67, on p. 33). In Table A-1, the AEG report chooses tax-price elasticities with respect to individual business taxes in this range, with the alternative tax elasticity for MEGA exactly in the middle of this range, at −0.35. The −0.1 to −0.6 research consensus AEG describes goes back to the review of the business location research literature by Bartik (1991, pp. 36–44), which reviews 59 studies of

Short-run elasticities would be even less. As mentioned, the available research literature suggests that the economy only gradually adjusts to lower business taxes. Helms's (1985) research, as reviewed in Bartik (1991), implies that a business tax reduction will have about 61 percent of its long-run effects after 10 years.[30] The REMI model used in this report implies that the immediate effects of a business tax cut, after one year, will be about half of the 10-year effects. Thus, we might expect the short-run elasticity of Michigan business activity with respect to a cut in the MBT to be only one-third or so of the long-run elasticity, or something less than −0.010.

Thus, the elasticities assumed in the AEG report for responses to MBT reductions are over 10 times the long-run elasticities implied by the research literature on business location responses to business taxes, and over 30 times the short-run elasticities implied by the research literature. As a result, the implied effects they get for cutting business taxes are 10 to 30 times as great as one would expect based on the research literature.

3) Allowing for important multiplier effects of MEGA. The AEG report does not appear to allow MEGA to have multiplier effects. Yet regional econometric models such as the REMI

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how interstate or intermetropolitan location decisions respond to state and local business taxes. Bartik (1991) states that "The long-run elasticity of business activity with respect to state and local taxes appears to lie in the range of −0.1 to −0.6 for intermetropolitan or interstate business location decisions..." (p. 43). But this elasticity is meant to apply to percentage reductions in all state and local business taxes. It doesn't make sense to assume that business activity will respond by as great a percentage to a 10 percent cut in a tax that is small as it will to a 10 percent cut in a tax that is large. In Appendix 2.1 of Bartik (1991), it is shown that the elasticity of business activity with respect to a percentage change in some cost factor is likely to be approximately proportional to that factor's share in overall business costs. In other words, what really determines business location decisions is overall business costs, and a percentage change in some cost factor will have an impact dependent on how much that percentage change affects overall business costs. Therefore, the elasticities with respect to individual business taxes will be reduced below the −0.1 to −0.6 range. If a given business tax is only 20 percent of overall state and local business taxes, a percentage tax reduction in that individual tax will only have 20 percent of the impact of the same percentage reduction in overall business taxes, because that individual tax only has 20 percent as much impact on costs as total business taxes. The −0.027 elasticity derived for the MBT in this appendix is not only consistent with the business location literature, it in fact is derived from Wasylenko's argument that −0.2 is the most reasonable consensus value for the overall business tax elasticity, within the −0.1 to −0.6 range suggested by Bartik (1991).

[30] As mentioned in a previous footnote, the −0.1 to −0.6 range for the business tax elasticity refers to a long-run elasticity (Bartik 1991, p. 43).

model suggest that the MEGA program has sizable multipliers. We estimate that the employment model for MEGA is 3.88 as of 2007. By not counting these multiplier jobs, the AEG model understates the economic effects of MEGA by a factor of 4.[31]

4) Assuming an effectiveness of MEGA that is consistent with the business location literature. The AEG report assumes a higher percentage of MEGA projects are induced by MEGA than the 8.2 percent that our report assumes if the MEGA program does not exercise selectivity. AEG assumes 50 percent effectiveness, about six times as high as the current report. This factor will tend to make the MEGA program look six times better in the AEG report than is assumed in the lower-bound model of our report.

On the other hand, the AEG report assumes that only 40 percent of these induced jobs are retained after 10 years. This would appear to mean that after 10 years, the percent of subsidized jobs that are actually induced is only 20 percent. This is a little more than twice the effectiveness assumed as a lower bound in the current report.

In the current report, jobs are only counted if they are still being subsidized by MEGA. Therefore, if the job goes away, so does any impact from the job. But the cost of the subsidy then also goes away.

Factors 1 and 2 affect AEG's impact estimates compared to our estimates for the alternative business tax reduction. Factor 1 would appear to cause the alternative tax reductions to be at least two to three times too big, and therefore the number of jobs gained from alternative

[31] It could be argued that the AEG model is symmetrical by not allowing a multiplier for cuts in the MBT. Yet such a multiplier is implicitly assumed in allowing the elasticity of response to the MBT cut to apply to the entire MBT base, not just the export-base MBT businesses. In conventional regional econometric models, the elasticity of response would apply only to the export-base sector, which would then have multiplier effects on the nonexport base sector. In some simple models, the multiplier would be assumed to be the ratio of the total business tax base to the export-based business tax base. Assuming that the MBT elasticity applies to the total business tax base is equivalent to assuming such a multiplier effect.

tax reductions to be at least two to three times too big. Factor 2 indicates that the elasticities assumed in the AEG report are from 10 to 30 times bigger than are assumed in the current report, with the current report's estimates based more squarely on the research literature. Factors 1 and 2 together would appear to cause AEG's estimated economic effects of the alternative reduction in the Michigan Business Tax allowed by eliminating MEGA to be 20 to 90 times as great as are estimated in the current report.

Factors 3 and 4 affect AEG's impact estimates compared to our estimates for MEGA. Factor 3 causes MEGA's effects to be one-fourth of this report's estimates, which incorporate multiplier effects for MEGA. Factor 4, on the other hand, causes the MEGA program to be two to six times more effective in AEG's report than our lower-bound assumptions. Taking Factors 3 and 4 together means that the AEG report's assumptions would be expected to result in MEGA effects from one-half to one-and-one-half times the current report's estimates ($\frac{1}{2} = 1/4 \times 2$; $1\text{-}1/2 = 1/4 \times 6$).

This analysis is very roughly consistent with Table B.1. If we multiply our estimated effects for the Michigan Business Tax Reduction by 12.35, we get a figure for jobs created in 2006 of around 17,700, which matches the AEG's 10-year job creation figure for replacing MEGA with an MBT reduction.

We will close on a note of agreement between our report and the AEG report. The AEG report argues that MEGA is more effective if it is more selective. As pointed out in our main text, we also believe that the effectiveness of the MEGA program can be improved if MEGA is more selective.

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