Robbing Peter to Pay Paul: The Employment Effects of the Missouri Quality Jobs Program

Wall, Howard

Center for Economics and the Environment, Lindenwood Univesity

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Howard J. Wall

Center for Economics and the Environment
Lindenwood University

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Abstract

This paper is an assessment of the employment effects of the Missouri Quality Jobs Program, which awards tax credits to businesses so as to spur state job creation. According to the Missouri Department of Economic Development, which adminsters the program, the tax credits rewarded under the program have, created more than 10,000 new jobs, so far, and will generate a net increase of more than 50,000 jobs by 2020. My estimates indicate, however, that the program simply transfers jobs to subsidized projects from the rest of the economy, while also creating labor-market distortions. My baseline estimates indicate that there were about 5,000 fewer private-sector jobs in Missouri in 2011 because of the program. Alternative estimates suggest even larger job losses. The most-likely best-case scenario for the long run is that the hundreds of millions of dollars transferred to businesses under the program will have led to no net change in state employment.

I. Introduction

This paper examines the effectiveness of state development tax credits in generating employment gains. Specifically, it estimates the employment effects of the Missouri Quality Jobs Program (MQJP), the declared purpose of which is to "(f)acilitate the creation of quality jobs by targeted business projects" by awarding tax credits in support of qualifying projects. Tax credit programs such as the MQJP are quite common around the country and are touted by state economic development agencies as important components of their development efforts. Nonetheless, there is little evidence that targeted tax credits and similar policies are effective in spurring economic development and employment (Wall, 2011). In fact, two recent studies of employment tax credits in Michigan found that the state's MEGA tax credits were sometimes responsible for losses in overall employment (LaFaive and Hicks, 2011; LaFaive and Hohman, 2009).[1]

In their survey of the academic literature on targeted development policies such as state tax credits, Peters and Fisher (2004) concluded that (1) there is little-to-no evidence that these policies lead to significant new investment or jobs; (2) much of the benefit of the policies go to people who live elsewhere, especially when they are targeted at distressed areas; and (3) alleged gains to tax-revenue are illusory because any revenue gains from subsidized firms or areas will simply be offset by revenue lost from elsewhere in the economy. Bartik (2005) also found only modest evidence that they had had much of an effect, although he attributed their failure to the tendency to use them where they are needed the least rather to unsound theoretical underpinnings.

For development tax credits to work there must be some market failures, such as imperfect capital markets or agglomeration economies, that create a gap between the actual and

[1] Bartik and Erickcek (2010) dispute these results.

efficient levels of local employment. If there are such market failures, the argument goes, then there might be room for a properly structured program that would use state money to direct resources to close these employment gaps. Broadly speaking, therefore, if a tax credit program fails to deliver on promised jobs, it was either because market failures were not significant drags on employment, or because the program was not structured properly. On the heels of the programs' aforementioned history of failure, significant improvements have been made in how they are structured.[2] Specifically, recent incarnations of state tax credit programs are designed with much greater accountability to ensure a closer link between promised and realized new jobs at firms receiving the tax credits.

In many respects, the MQJP has been ahead of the curve in terms of accountability in that it includes provisions for cancelling tax credits in the event that job-creation thresholds are not met, which it did for 33 projects in 2012.[3] In addition, despite the extremely weak national economy following the launch of the MQJP, Missouri has so far maintained program accountability, thereby bucking the tendency for governments to erode accountability during difficult economic times (Zheng and Warner, 2010).[4] Given its relatively sound structure, therefore, the success or failure of the MQJP in delivering on employment creation is likely attributable to the extent to which it is based on solid economic efficiency grounds rather than on the soundness of its administration.

[2] See Zheng and Warner (2010) for a nice discussion of trends in the types of policies employed and the reasons the policies have persisted despite the lack of evidence of their effectiveness.
[3] By 2009, only 23.1 percent of local governments included such clawbacks in their programs (Warner and Zheng, 2013).
[4] I should note that the Missouri state auditor issued a report chastising the state's Department of Economic Development over its administration of the MQJP (http://www.auditor.mo.gov/Press/2012-65.pdf). Most of the report had to do with the methods used to calculate job gains at recipient firms, which is largely beside the point in determining the actual effectiveness of the program.

2. The Program and Its Promises

Tax credits have been awarded under the MQJP since 2006 and are distributed under three business sub-categories—small/expanding, technology, and high-impact—each with its own set of eligibility criteria and program benefits.[5] By 2012, the number and total value of tax-credit authorizations were both more than double their 2006 levels, although this trend was interrupted a great deal by the national recession of 2008-09 (Figure 2).[6] The increase in the anticipated number of new jobs at recipient firms roughly doubled between 2006 and 2012, although, as shown in Figure 3, the number of actual new jobs is, so far, well short of what had been anticipated when the credits were authorized. Obviously, the lag between the date of authorization and the actualization of new jobs accounts for most of the shortfall for 2010-12, but even credits authorized in 2006-08 have fallen well short of their promise. Perhaps the credits from those years would look more successful if it weren't for the recession of 2008-09.

The most recent claims made by the Missouri Department of Economic Development (DED) about the direct effects (new jobs at firms that were awarded tax credits) and indirect effects (spinoff jobs and multiplier effects) of the MQJP are contained in the program's 2012 annual report.[7] At the end of 2012, there were 220 active supported projects, 73 of which were newly authorized in 2012.[8] The DED claims that projects authorized through 2011 were directly responsible for 10,137 actual new jobs by the end of 2012—with more to come as the projects progress—and that the 73 new projects are anticipated to directly generate another 7,054 new jobs in five years time. After plugging their estimates of direct job growth into their forecasting

[5] The Missouri Department of Economic Development has a very useful summary of the program online (http://www.ded.mo.gov/BCS%20Programs/BCSProgramDetails.aspx?BCSProgramID=76).
[6] These numbers are summed across the three sub-programs and include all authorizations that were not disqualified.
[7] Missouri Quality Jobs Annual Report 2012 (http://ded.mo.gov/upload/2012annualreport.pdf).
[8] Note that some projects approved in prior years are removed from the list of active projects because they do not meet or maintain the requirements of the program. In 2012, for example, 33 projects had their program approval rescinded.

model, DED arrives at the claim that the tax credits awarded through 2012 will have created 50,096 jobs (directly and indirectly) by 2020, or 118 jobs for each million dollars in tax credits.

There are a number of reasons to doubt the DED's claims about the effects of the MQJP. With regard to direct job creation, the DED is being naïve, or perhaps narcissistic, in assuming that the supported projects exist only because of the MQJP tax credits, and that all of the anticipated new jobs will end up as actual new jobs. These assumptions fly in the face of the evidence.[9] Perhaps even more absurd is how the DED presumes that none of the new jobs are filled by workers who were already employed elsewhere in Missouri.[10] As for the broader indirect effects, the DOD relies on the belief that the reshuffling of employment that occurs between subsidized and unsubsidized firms must be greatly outweighed by large spinoff and multiplier effects. This belief is embedded into the DED's forecasting model which, despite a veneer of quantitative detachment, is simply a mathematical specification of the DED's prior beliefs about how the economy works. More precisely, the primary sources of the indirect gains predicted by DED's REMI forecasting model are illusive multiplier effects that the DED believes will dominate the substitution effects across firms and communities (Mills, 1993). This notion is, to say the least, extremely controversial among economists in that regional forecasting models are afflicted with many of the same problems as the outdated national forecasting models from the 1960s and 1970s on which they are based.[11]

Because the MQJP has been in place for several years, it is no longer necessary to rely on the DED's dubious claims about the future effects of the program. It is instead possible to

[9] See Gabe and Kraybill (2002) for the experience in Ohio, and Faulk (2002) for the experience in Georgia.
[10] Nationally, about one-third of all new jobs in the United States are filled by job switchers and there are large differences in job-switching rates across industries (Hyatt and McEntarfer, 2012).
[11] As summarized by Rickman (2010), regional forecasting models "suffer from the Lucas critique, equation parameters may be unstable over time, and their lack of deep structure confounds interpretation of estimated parameters."

compare actual employment outcomes against those promised by its supporters, which is the objective of the present paper. Below, in Section 3, I specify the empirical model that I use to estimate the effects of the MQJP on Missouri employment. The empirical results are presented in section 4, and are used to calculate aggregate employment effects in section 5. Section 6 concludes.

3. Empirical Model

As a practical matter, it is not possible to trace the various employment effects of a tax credit authorization back their source, so it is necessary to instead look at aggregate employment. Also, because state-level data would not be terribly informative given that it would only provide several observations, I use county-level data with the objective of detecting statistical patterns between levels of county employment and the amount of tax credits that counties received. My data set uses annual private employment for 1998-2011 for all counties in Missouri from the Census Bureau's County Business Patterns. It is a balanced panel of 114 counties in which the independent city of St. Louis is included as a county and Worth County is excluded because of missing data. Tax credit data are converted to 2011 dollars using the CPI deflator from the Bureau of Labor Statistics and include all tax credits that were authorized, including those that were subsequently canceled for failing to meet the program's performance criteria.

My primary interest is in deviations from baseline employment that are due to the effects of tax credits, which can affect employment over many years and have different effects over time. To account for this, the specification allows for employment in a given year to be related to the value of the tax credit awarded during that year and during each of the previous five years (which, given the data set, is the maximum lag). Analogous variables are also included to

capture the effects of tax credits received by neighboring counties. To eliminate the effects of fluctuations in employment due to the business cycle, my dependent variable is county-level shares of state employment. To control for changes in county employment shares that are unrelated to the MQJP, I assume that each county has its own quadratic trend. Note that my estimates look at the net effects of tax credits and do not distinguish between direct, indirect, spinoff, or multiplier effects.

The effectiveness of tax credits might differ a great deal on the extent to which the labor markets in neighboring counties are integrated with one another. Many Missouri counties are part of larger economically integrated entities: 17 are in one of two large metropolitan statistical areas (MSAs), another 17 are in one of six small MSAs, and ten are in micropolitan areas (μSAs) with more than one county. Counties within these entities are, by definition, economically integrated, so I account for the possibility that tax credits have different effects on them than on nonmetro counties. Finally, the specification also accounts for border effects to control for the fact that Missouri's two large MSAs contain substantial areas in other states and that 46 of Missouri's counties are on the state border.

Given the considerations outlined above, I specify E_{it}, county i's relative employment at time t as

$$\begin{aligned} E_{it} = {} & \alpha_{0i} + \beta_{1i} t + \beta_{2i} t^2 \\ & + \sum_{j=0}^{5} (\theta_j + \omega_j S_i + \lambda_j L_i + \kappa_j B_i) C_{it-j} \\ & + \sum_{j=0}^{5} (\gamma_j + \upsilon_j S_i + \delta_j L_i + \pi_j B_i) N_{it-j} + \mu_{it}. \end{aligned} \tag{1}$$

In (1), C_{it} is the real amount of tax credits authorized for firms in county i in year t and N_{it} is the corresponding measure for county i's neighbors. To differentiate the effects of tax credits across types of counties, there are three interaction dummies for each of C_{it} and N_{it}: S_i equals one if the

county is in a small MSA or a μSA composed of more than one county, L_i equals one if the county is in one of the state's two large MSAs, and B_i equals one if the county borders another state. The possible lags in the effects of tax credits are captured by including the levels of tax credits over a six-year period, with the year of authorization denoted as $j = 0$. Because (1) includes lags in the effects of tax credits, and because of the wide disparity in employment shares across counties, the estimation allows for autocorrelated errors and is corrected for heteroskedasticity, respectively. To obtain estimates with these corrections, I estimate expression (1) using Feasible Generalized Least Squares.

4. Estimation Results

The estimation results for the unrestricted version of equation (1) are provided in Table 1, which, for space considerations, does not include the estimates of the 228 county-level trend coefficients or the 114 county-specific intercepts. A set of alternative results under various restrictions on the interaction terms in (1) are provided in the appendix. It should be noted at the outset that all of the estimated effects for the fifth year after authorization are based on very few observations: Only nine counties received tax credits in 2006, so there are only nine observations of the effects of tax credits in the fifth year after authorization. For the most part, therefore, these estimates can be safely ignored, although they need to be obtained to guard against estimation bias.

The effects in the first column of Table 1 are for a baseline county that is not in a metro area and does not border another state. For these counties, tax credits have positive and statistically significant effects on employment in the year of authorization through the third year after authorization. In subsequent years, however, the effects are statistically no different from

zero. In contrast, employment in non-metro counties tends to be reduced by the tax credits received by neighboring counties. The neighbor effects for the fourth and fifth year after authorization are not statistically significant, however.

Figure 3 illustrates the effects of one million dollars in tax credits on a non-metro county and its neighbors. To calculate the effects illustrated by Figure 3, recall that county employment is measured as a fraction of state employment and note that over the period 2006-11 a percentage point of employment was, on average, 22,232 jobs. The marginal effect of one million dollars of tax credits is, therefore, 22,232 times the estimated coefficient for the relevant variable. Also note that the neighbor effects reported in Table 1 indicate the marginal effects of neighbors' tax credits on only one county, so the full effect on neighbors is the relevant coefficient times 3.42, the average number of neighbors for counties that received tax credits. For the year of authorization and the following three years, the effects on a county and its neighbors are statistically significant although, as is apparent from the figure, the large positive effects on the recipient county is usually cancelled out by roughly comparable job losses in neighboring counties. The solid line in the figure represents the net employment effect for each year, and is small and positive for three of them, rising to 45 jobs by the third year after authorization. By the fourth year after authorization neither the recipient county nor its neighbors see a statistically significant effect on employment because of the tax credits.

It's not possible to know the precise sources of the job gains and losses illustrated in Figure 3 because they include the direct gains at recipient firms, substitution effects on other firms, and spinoff and multiplier effects. The results do, however, illustrate that one county's gains are likely at the expense of other local economies, and not by attracting workers out of unemployment or by generating large multiplier effects. The importance of these cross-county

effects is highlighted further by the large and statistically significant negative neighbor effects for counties in μSAs and small MSAs.

The closer integration of counties in μSAs and small MSAs mean that the negative effects of tax credits on a county's neighbors are significantly larger than are illustrated in Figure 3. During the authorization year and the year following it, a county within a small metro area tends to see an additional boost in employment when firms in one of its neighbors receive tax credits. Perhaps this is because the entire metro area is participating in construction-related activities for the supported projects. Subsequently, however, the neighbor sees increasingly large negative effects that are in addition to the non-metro neighbor effects already described. In contrast, there is little additional neighbor effect when the county is in a large MSA other than in the year after authorization. Perhaps this should be expected because the smallness of μSAs and MSAs means that neighbor effects will be more obvious statistically. That is, the metro-area neighbor effect might be highly diluted in large metro areas such as Kansas City and St. Louis, which have 16 and 17 counties, respectively.

5. Adding it up

To get an idea of the effects of a tax credit authorization over its life cycle, I applied the marginal effects described in the previous section to the tax credits that were authorized through 2011.[12] I then aggregated the estimated effects on 2011 employment according to the year in which the credits were authorized and whether the credits were received by a county or by its neighbors. The total effects in terms of employment per million dollars of tax credits are illustrated by Figure 4. The figure shows the own effects, the neighbor effects, and the net effects by the number of years since the tax credits were authorized.

[12] I used only the coefficients that were statistically significant at the 10 percent level or better.

According to the estimates summarized by Figure 4, tax credits led to a net increase in state employment only during the year of authorization and the following year. Specifically, in the year of authorization, tax credits led to 128 more jobs per $1 million in the recipient counties, but a loss of 110 jobs per $1 million in neighboring counties. In the year following authorization, recipient counties and their neighbors tended to see increased employment: 249 and 82 jobs per $1 million, respectively. Beyond this initial start-up period, however, job gains in the recipient counties tended to have been more than cancelled out by job losses in neighboring counties: The net effects were losses of 42 and 50 jobs per $1 million in tax credits during the second and third years after authorization. By the fourth year after authorization, there were no statistically significant effects on the recipient counties' employment, but neighbors tended to have lost 85 jobs per $1 million in tax credits.

If the employment effects illustrated in Figure 4 are aggregated, the estimated net employment effect of the MQJP on Missouri employment in 2011 is a loss of 16 jobs per $1 million dollars of tax credit authorized between 2007 and 2011. Put another way, in 2011, there were 5,379 fewer jobs in Missouri because of the MQJP. Note, however, that this estimate is arrived at by using only those estimated marginal effects that were statistically significant at the 10 percent level or better. Although standard, this significance level is nonetheless arbitrary, so it is worth examining how the estimates would differ under a couple of alternative standards. The various alternatives are presented in Table 2.

The middle row of Table 2 breaks down the estimates discussed above of the effects of the MQJP on Missouri private employment in 2011: Using only those coefficients from Table 1 that are statistically significant at the 10 percent level or better, the MQJP increased the level of employment in counties receiving tax credits by 36,454, but decreased private employment in

neighboring counties by 41,833. If we tighten the statistical significance standard to include only those estimates that are significant at the 5 percent level or better, the program looks much worse: It led to 19,613 more jobs in recipient counties but 44,034 fewer jobs in neighboring counties, meaning that in 2011 there were 23,237 fewer private sector jobs in Missouri because of the program. Alternatively, if we ignore statistical significance and use all of the point estimates, the MQJP led to 27,923 more jobs in recipient counties, but 40,900 fewer jobs in neighboring counties, or just under 13,000 fewer jobs statewide.

6. Conclusions

The MQJP has been in place long enough to obtain statistical evidence of its effects on the communities with firms receiving tax credits under the program. Under a variety of assumptions, I find that counties receiving tax credits under the program tended to see increases in employment for a few years, but that these effects were not sustained beyond three years. Also, the increased employment in recipient counties tended to be at the expense of neighboring counties. Overall, my baseline estimate is that there were 5,379 fewer private-sector jobs in Missouri in 2011 because of the MQJP.

It is important to remember that my estimate of the net effect of the MQJP on employment is aggregated across tax credits of different vintages and that the effects differ by the amount of time since tax credits are authorized (Figure 4). In the short run—the first two years—tax credits are associated with job gains in the recipient county and its neighbors. Over the medium run (the next two years), however, the recipient county gains employment only at the expense of its neighbors, and there is a net loss of jobs. At the beginning of the long run—the fourth year after authorization—there are no longer any signficant job gains in the recipient

county, but the market distortions created by the tax credits mean that there are still significant job losses in neighboring counties. It's not possible given the data available to estimate what happens beyond this early stage of the long run, but it is difficult to imagine that the trend reverses enough to come close to the DED's projection of 118 new jobs per million dollars of tax credits. The more-likely best-case scenario is that the employment distortions eventually work themselves out and the net effect of of the tax credits approximates zero.

Finally, there are many possible avenues through which the effects of a tax credit will permeate through the rest of the economy. As such, each individual tax-credit authorization will have its own set of effects, depending on the local and industrial characteristics of the recipient county. My estimates are of the average effects of tax credits, so it is entirely possible that some of the specific projects that have received support under the MQJP have had net positive effects. It is probably not possible at this stage to know which of the projects might worked. At any rate, it is extremely difficult to square the large negative effects that the MQJP has so far had on employment with the DED's prediction that by 2020 the program will have created tens of thousands of jobs that otherwise wouldn't have existed.

Appendix: Alternative Specifications

Equation (1) allows for a variety of employment effects in addition to those on the counties receiving tax credits: (i) neighbor effects, (ii) metro effects, and (iii) border effects. As reported in Table 1, each of these categories had at least one statistically significant coefficient, so each also had a role in determining the estimates of the total effects of the MQJP summarized in Table 2. The purpose of this appendix is to test alternative specifications that restrict the effects of these categories to zero. The results of three restricted estimations, each of which excludes one category of variables, are summarized in Table A.

The first restricted model assumes that there are no neighbor effects and this restriction has little effect on the rest of the estimates, even though neighbor effects were found to be statistically significant in the unrestricted estimation. This result is readily apparent from a comparison of Table 1 to Table A and indicates there was no localized spatial correlation in the allocation of tax credits under the program. The second set of restricted results show the statistical importance of including metro effects to avoid biasing the estimates of the rest of the model. Specifically, the positive and statistically significant effects of counties' own credits for the year of authorization and the third year following authorization would not be obtained, and the coefficients on the neighbor effects would be reduced by one third to one half. Finally, even though only one of the border coefficients in the unrestricted estimation was statistically significant, if it were assumed that the effect of being on the border was zero, the positive effect found for counties' own tax credits would be reduced for all years of authorization that are statistically significant in the unrestricted estimation.

Table A. Alternative Estimation Results: Dependent Variable = County Relative Employment

	No Neighbor Effects				No Metro Area Effects		No Border Effects		
	Non-Metro	Small Metro	Large Metro	Border	Non-Metro	Border	Non-Metro	Small Metro	Large Metro
Effects of Own Credits	$\theta_0,\ldots,\theta_5$	$\omega_0,\ldots,\omega_5$	$\lambda_0,\ldots,\lambda_5$	$\kappa_0,\ldots,\kappa_5$	$\theta_0,\ldots,\theta_5$	$\kappa_0,\ldots,\kappa_5$	$\theta_0,\ldots,\theta_5$	$\omega_0,\ldots,\omega_5$	$\lambda_0,\ldots,\lambda_5$
Authorization year	0.0045*	-0.0047	-0.0018	-0.0056	0.0025	-0.0041	0.0023	-0.0057	-0.0042
	(0.0021)	(0.0053)	(0.0042)	(0.0035)	(0.0021)	(0.0055)	(0.0015)	(0.0068)	(0.0061)
Year after authorization	0.0092*	0.0073	-0.0094†	-0.0055	0.0091*	-0.0057	0.0073*	0.0065	-0.0116
	(0.0030)	(0.0101)	(0.0055)	(0.0046)	(0.0029)	(0.0067)	(0.0021)	(0.0104)	(0.0077)
Second year after authorization	0.0067†	0.0042	-0.0077	-0.0048	0.0062†	-0.0015	0.0055*	0.0011	-0.0051
	(0.0035)	(0.0134)	(0.0056)	(0.0056)	(0.0035)	(0.0080)	(0.0024)	(0.0140)	(0.0079)
Third year after authorization	0.0096*	-0.0242	-0.0013	-0.0113	0.0043	-0.0031	0.0056†	-0.0228	-0.0042
	(0.0044)	(0.0159)	(0.0072)	(0.0069)	(0.0043)	(0.0092)	(0.0031)	(0.0158)	(0.0096)
Fourth year after authorization	0.0045	-0.0164	-0.0025	-0.0086	0.0044	0.0012	0.0033	-0.0177	-0.0005
	(0.0043)	(0.0162)	(0.0079)	(0.0083)	(0.0043)	(0.0111)	(0.0035)	(0.0161)	(0.0104)
Fifth year after authorization	-0.0094	-0.1112	0.0072	0.0129	0.0066	0.0116	0.0195	-0.1359	-0.0123
	(0.0625)	(0.1358)	(0.0623)	(0.0144)	(0.0068)	(0.0149)	(0.0649)	(0.1369)	(0.0660)
Effects of Neighbors' Credits					$\gamma_0,\ldots,\gamma_5$	$\pi_0,\ldots,\pi_5$	$\gamma_0,\ldots,\gamma_5$	$\delta_0,\ldots,\delta_5$	$\upsilon_0,\ldots,\upsilon_5$
Authorization year					-0.0005*	0.0018	-0.0012*	0.0023*	0.0021
					(0.0002)	(0.0019)	(0.0003)	(0.0007)	(0.0018)
Year after authorization					-0.0007*	0.0042†	-0.0020*	0.0016	0.0029
					(0.0003)	(0.0023)	(0.0004)	(0.0010)	(0.0022)
Second year after authorization					-0.0010*	0.0004	-0.0022*	-0.0033*	0.0013
					(0.0003)	(0.0028)	(0.0004)	(0.0014)	(0.0030)
Third year after authorization					-0.0016*	0.0021	-0.0022*	-0.0065*	0.0022
					(0.0004)	(0.0033)	(0.0005)	(0.0016)	(0.0033)
Fourth year after authorization					-0.0003	-0.0043	-0.0003	-0.0087*	-0.0027
					(0.0004)	(0.0043)	(0.0005)	(0.0016)	(0.0044)
Fifth year after authorization					-0.0006	-0.0008	-0.0028†	0.0308*	0.0012
					(0.0010)	(0.0061)	(0.0017)	(0.0102)	(0.0061)

The estimation includes county fixed effects and county-specific quadratic trends, which are not reported here. Estimation is performed using Feasible Generalized Least Squares with corrections for heteroskedasticity and autocorrelation. Statistical significance at the 5 percent and 10 percent levels are indicated by "*" and "†", respectively. Data are annual for 114 Missouri counties covering 1998-2011.

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Table 1. Base Estimation Results: Dependent Variable = County Relative Employment

	Non-Metro	Small Metro	Large Metro	Border
Effects of Own Credits	$\theta_0,\ldots,\theta_5$	$\omega_0,\ldots,\omega_5$	$\lambda_0,\ldots,\lambda_5$	$\kappa_0,\ldots,\kappa_5$
Authorization year	0.0046 *	-0.0082	-0.0017	-0.0056
	(0.0020)	(0.0068)	(0.0053)	(0.0036)
First year after authorization	0.0090 *	0.0049	-0.0091	-0.0047
	(0.0028)	(0.0104)	(0.0068)	(0.0047)
Second year after authorization	0.0062 †	0.0011	-0.0048	-0.0036
	(0.0034)	(0.0139)	(0.0070)	(0.0058)
Third year after authorization	0.0099 *	-0.0259 †	0.0008	-0.0114
	(0.0043)	(0.0157)	(0.0087)	(0.0073)
Fourth year after authorization	0.0050	-0.0181	-0.0011	-0.0078
	(0.0042)	(0.0160)	(0.0098)	(0.0088)
Fifth year after authorization	-0.0014	-0.1152	-0.0005	0.0165
	(0.0659)	(0.1371)	(0.0655)	(0.0166)
Effects of Neighbors' Credits	$\gamma_0,\ldots,\gamma_5$	$\delta_0,\ldots,\delta_5$	$\upsilon_0,\ldots,\upsilon_5$	$\pi_0,\ldots,\pi_5$
Authorization year	-0.0013 *	0.0024*	0.0000	0.0020
	(0.0003)	(0.0007)	(0.0010)	(0.0017)
First year after authorization	-0.0023 *	0.0017†	0.0030 *	0.0044 *
	(0.0004)	(0.0010)	(0.0011)	(0.0021)
Second year after authorization	-0.0022 *	-0.0034*	0.0001	0.0016
	(0.0005)	(0.0014)	(0.0018)	(0.0025)
Third year after authorization	-0.0023 *	-0.0065*	0.0027	0.0026
	(0.0006)	(0.0017)	(0.0022)	(0.0030)
Fourth year after authorization	-0.0002	-0.0088*	-0.0023	-0.0015
	(0.0006)	(0.0017)	(0.0033)	(0.0041)
Fifth year after authorization	-0.0029	0.0320*	0.0063	-0.0027
	(0.0018)	(0.0103)	(0.0049)	(0.0062)

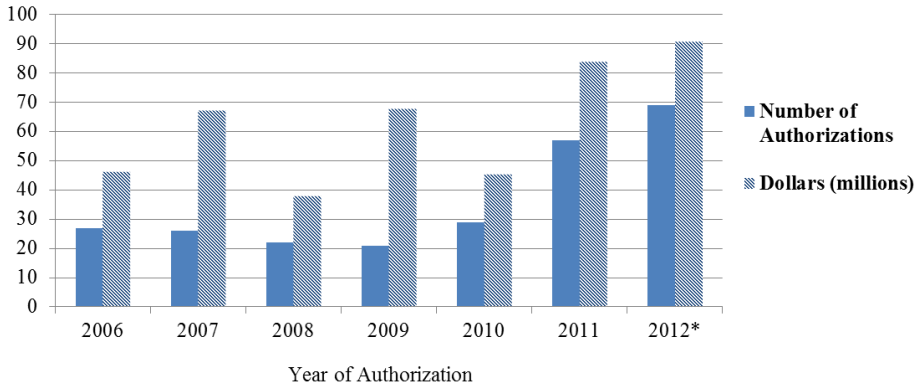
The estimation includes county fixed effects and county-specific quadratic trends, which are not reported here. Estimation is performed using Feasible Generalized Least Squares with corrections for heteroskedasticity and autocorrelation. Statistical significance at the 5 percent and 10 percent levels are indicated by "*" and "†", respectively. Data are annual for 114 Missouri counties covering 1998-2011.

Table 2. The Effects of the MQJP on State Employment, 2011

Significance threshold	Own Effects	Neighbor Effects	Net Effects
Five percent or better	19,613	-44,034	-23,327
	57	-127	-67
Ten percent or better	36,454	-41,833	-5,379
	105	-121	-16
Any significance level	27,923	-40,900	-12,978
	81	-118	-38

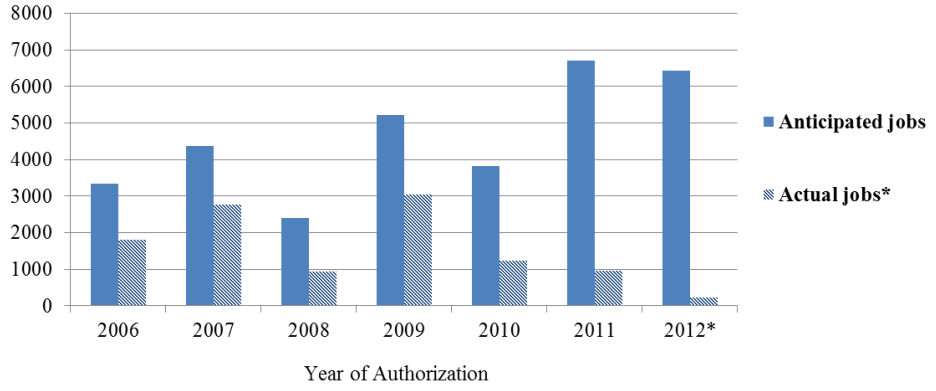
The first two sets of calculations use only those coefficients that are statistically significant at, respectively, the 5 percent or 10 percent level or better. The third set uses all estimated coefficients, regardless of their statistical significance. For each pair of numbers, the top one is the effect in terms of the number of jobs and the bottom one is the number of jobs per $1 million of tax credits awarded.

Figure 1. Tax Credit Authorizations Under the Missouri Quality Jobs Program



* Through October 2012. Source: Missouri Department of Economic Development.

Figure 2. Jobs at Recipient Firms Under the Missouri Quality Jobs Program



* Through October 2012. Source: Missouri Department of Economic Development.

Figure 3. Employment Effects for a Non-Metro County

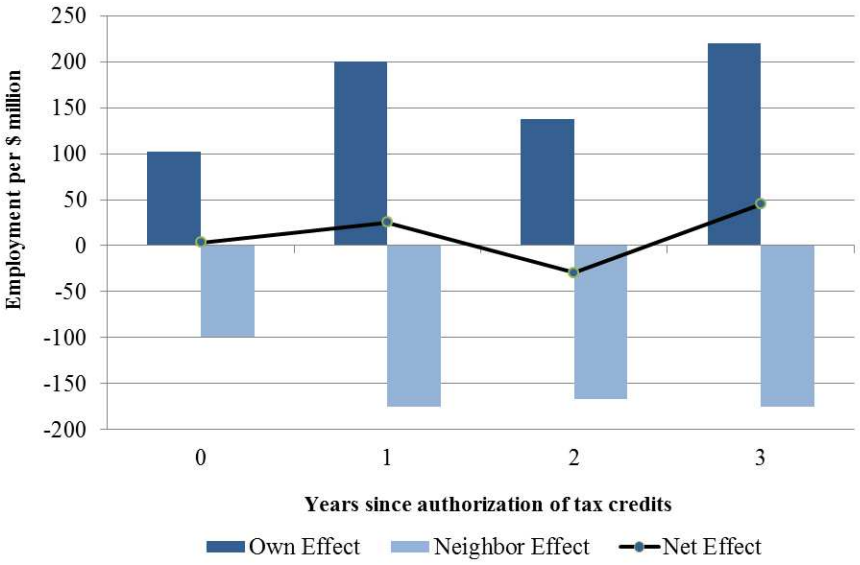
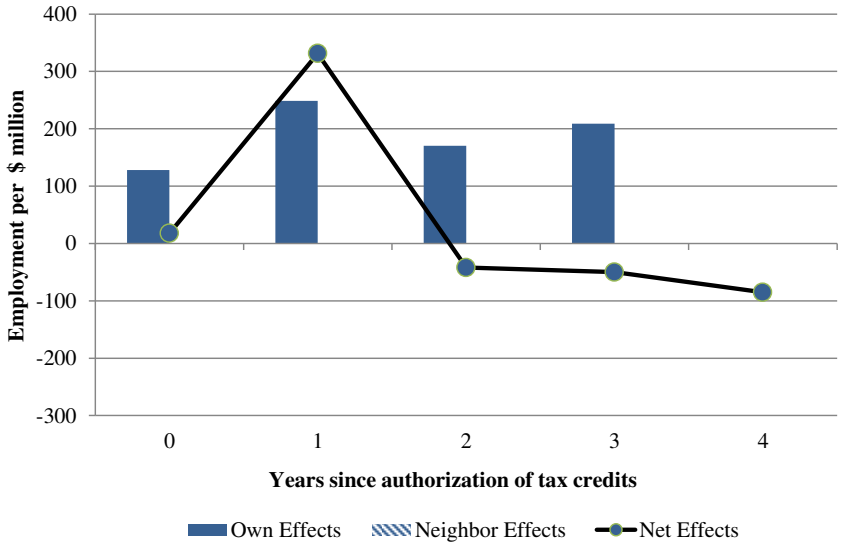


Figure 4. The Effect of Tax Credits by Authorization Year, 2011



Note that the calculations include only those effects that are statistically different from zero at the 10 percent or better level.