Extensions and Re-Estimations for:
Do *Some* Enterprise Zones Create Jobs?[*]

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In our original paper (Kolko and Neumark, 2010),[1] in addition to models for the effects of enterprise zones and their characteristics on the levels of employment, we also estimated models for the effects on the growth rate of employment, using the specification (equation (2) in the paper:[2]

$$(1) \qquad Y_{jkt} = \alpha + \beta EZ_{jkt} \cdot t + \sum_{j'=1}^{J} \left\{ \sum_{k'=0 or1}^{K_j} D_{j'k'} \lambda_{j'k'} \right\} + \sum_{t'=1}^{T} D_{t'} \theta_{t'} + \sum_{j'=2}^{J} \sum_{t'=1}^{T} \{ D_{j'} \cdot D_{t'} \} \tau_{j't'} + \varepsilon_{jkt}.$$

In this specification, enterprise zone designation shifts the growth rate of employment. The variable t with which EZ is interacted was defined as a time trend (beginning with 1 in 1992, the first year of the data). However, a more appropriate specification (because it does not imply differently-sized effects depending on the year the zone was designated) would define t as the number of years since the enterprise zone was designated. One advantage of specifying the model that way is that then the model for changes in Y takes on a very simple and intuitive form:

$$(2) \qquad \Delta Y_{jkt} = \alpha + \beta EZ_{jkt} + \sum_{t'=1}^{T} D_{t'} \theta_{t'} + \sum_{j'=2}^{J} \sum_{t'=1}^{T} \{ D_{j'} \cdot D_{t'} \} \tau_{j't'} + \varepsilon_{jkt}.$$

This model simply captures the effect of enterprise zone designation on the growth in Y. Note that the subzone dummy variables (in the first double sum in equation (1)) drop out.

To explore the sensitivity of the estimates to these alternative specifications, in this note we present the main estimates done in different ways. We first show the original results. We then show the results defining t as the number of years since the zone was designated. We then show some more restrictive estimating that come from estimating specifications including one interaction at a time, rather than all of them simultaneously. Finally, we estimate all of these versions of the models using the first-difference specification in equation (2).

The tables that follow show that, for the simpler models in which we do not enter a very large set of interactions or exclude the control rings, the results are very similar. For the models that are far more demanding of the data—excluding the control rings and including all the interactions simultaneously—the

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[1] Kolko, Jed, and David Neumark, "Do *Some* Enterprise Zones Create Jobs?" *Journal of Policy Analysis and Management*, Vol. 29, No. 1, 2010, pp. 5-38.

[2] We refer the reader to the original paper for explanation of the specification and variables.

estimates are less robust, reflecting the fact that in these models it is simply very hard to identify the interactive effects of interest. Note that this was also the case in the original paper. For example, in Table 7 of the original paper (Table 7A in this note), the estimates in columns (6) and (8), which exclude the control rings and include all of the interactions, become much less precise and often uninformative. Here (Table 7B) we see this imprecision exacerbated, as the standard errors get become even larger.[3] This mirrors some of the cautions we raised in our original paper concerning the limited number of zones and limited information on zones with which to estimate a rich set of interactive effects.

The key conclusion we drew in the paper were as follows: (1) enterprise zones have favorable effects on employment in areas that originally had a lower share of employment in manufacturing; (2) enterprise zones are more likely to boost employment when zone administrators report devoting more effort to marketing and outreach; and (3) employment effects are weakened by zone administrators' self-reported efforts to help firms get hiring tax credits. In all cases, though, note that these conclusions were stronger for the specifications in levels—which are not in question in this note—and for the specifications including the control rings.

In the attached tables, we see the following. First and most important, when the control rings are included, the estimates are very similar using the specification in the original paper, the specification changing the definition of t in equation (1), and using equation (2). Second, when the control rings are excluded, the estimates of the simpler specifications with fewer interactions are insensitive to redefining t or (equivalently) using the first-difference specification (columns (2) and (4) in Tables 7A, 7B, and 7C). Finally, for the two specifications which are most demanding—with all the interactions and excluding the control groups (columns (6) and (8) of Tables 7A-7C)—the estimates are more sensitive, echoing the imprecision of the original estimates (repeated in Table 7A). Nonetheless, the three main conclusions noted above regarding the share in manufacturing, marketing and outreach, and facilitating getting hiring tax

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[3] Reflecting this, the estimated main effects get implausibly large for a growth rate specification. If we estimate a more restrictive version of this model with all the interactions, but excluding all of the zone-year interactions (the second double-sum in equation (1)), we again get the much smaller and often statistically insignificant main effects that occur for the other less restricted specifications (although not surprisingly some of the other estimates are sensitive to the large number of exclusion restrictions involved).

credits, are never contradicted and are still supported in many of the specifications. We also show these findings in terms of the interactive effects evaluated at the 25th and 75th percentiles, in Tables 8A and 8B. Note, again, the robustness of the estimates in the specifications including the control rings, and that the qualitative conclusions are similar in all of the estimates.

The most important lesson from this additional analysis is that we can only reliably identify the interactive effects on employment of the zone characteristics we study with the somewhat simpler models, with subsets of zone characteristics considered separately, or including the control rings; and even then, our original cautions apply. Conditional on doing this, though, the conclusions are robust.

TABLE 4A (NON-INTERACTED MODELS)

	A. Shift in level (Table 4 of original paper)		B. Shift in growth rate (Table 4 of original paper)		C. Shift in growth rate (using years since subzone designated)		D. First difference version of C	
	With control rings (1)	Without control rings (2)	With control rings (3)	Without control rings (4)	With control rings (5)	Without control rings (6)	With control rings (7)	Without control rings (8)
Enterprise zone	-0.017 (0.047)	-0.012 (0.035)					0.004 (0.009)	0.009 (0.016)
Enterprise zone x linear trend			0.002 (0.011)	-0.007 (0.012)				
Enterprise zone x years since subzone designated					0.004 (0.011)	0.018 (0.010)*		
N	1300	962	1300	962	1300	962	1200	888

Standard errors clustered on enterprise zones are in parentheses. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

TABLE 7A. TABLE 7 AS IN KOLKO AND NEUMARK (2010)

	With control rings (1)	Without control rings (2)	With control rings (3)	Without control rings (4)	With control rings (5)	Without control rings (6)	With control rings (7)	Without control rings (8)
Enterprise zone x linear trend	0.004 (0.002)*	0.001 (0.005)	0.011 (0.004)**	0.012 (0.016)	0.011 (0.002)***	0.023 (0.018)	0.004 (0.002)**	0.010 (0.016)
Enterprise zone x linear trend interacted with:								
Share of employment in establishments with < 50 employees, 1992	0.035 (0.063)	-0.069 (0.151)			-0.010 (0.054)	-0.363 (0.458)	0.005 (0.057)	-0.229 (0.352)
Share of employment in manufacturing, 1992	-0.106 (0.050)**	-0.106 (0.121)			-0.065 (0.054)	-0.178 (0.343)	-0.101 (0.060)	-0.351 (0.301)
Employment density, 1992 ('000)	0.001 (0.001)	0.000 (0.003)			-0.001 (0.001)	-0.001 (0.003)	-0.001 (0.001)	-0.003 (0.003)
Percent adults 25 + with bachelor's degree, 1990, county	0.024 (0.093)	-0.142 (0.305)			0.155 (0.114)	-0.194 (0.321)	0.121 (0.092)	-0.058 (0.376)
Zone designation year (# years after 1986)	0.000 (0.001)	0.004 (0.002)*			0.001 (0.002)	0.002 (0.008)	0.002 (0.001)	0.005 (0.005)
Marketing (from survey: 1-5 scale)			0.007 (0.006)	0.014 (0.023)	0.007 (0.007)	0.024 (0.031)	0.010 (0.005)*	0.041 (0.024)*
Amending zoning (from survey: 1-5 scale)			0.001 (0.003)	0.008 (0.012)	0.002 (0.005)	-0.003 (0.018)	-0.001 (0.002)	-0.016 (0.019)
Training workers (from survey: 1-5 scale)			-0.004 (0.002)	-0.002 (0.012)	-0.001 (0.002)	0.005 (0.019)	-0.000 (0.002)	0.006 (0.017)
Facilitating earning tax credits (from survey: 1-5 scale)			-0.009 (0.005)**	0.002 (0.015)	-0.014 (0.006)**	-0.005 (0.021)	-0.013 (0.007)*	-0.012 (0.020)
Encouraging the building of additional infrastructure (from survey: 1-5 scale)			-0.005 (0.006)	-0.015 (0.006)**	-0.007 (0.005)	-0.017 (0.013)	-0.006 (0.003)*	-0.010 (0.012)
Offering other tax incentives, credits or discounts (from survey: 1-5 scale)			0.001 (0.004)	-0.018 (0.010)*	-0.002 (0.005)	-0.020 (0.012)		
N	1300	962	1092	767	1092	767	1300	962

TABLE 7B. SAME AS TABLE 7A, BUT WITH MODIFIED TREND

	With control rings (1)	Without control rings (2)	With control rings (3)	Without control rings (4)	With control rings (5)	Without control rings (6)	With control rings (7)	Without control rings (8)
Enterprise zone x years since subzone designated	0.005 (0.002)**	0.029 (0.008)***	0.012 (0.004)***	0.058 (0.047)	0.012 (0.003)***	0.098 (0.026)***	0.005 (0.002)**	0.095 (0.030)***
Enterprise zone x years since subzone designated interacted with:								
Share of employment in establishments with < 50 employees, 1992	0.058 (0.073)	0.292 (0.392)			0.012 (0.072)	-0.627 (0.409)	0.032 (0.077)	-1.009 (0.620)
Share of employment in manufacturing, 1992	-0.101 (0.056)*	0.109 (0.219)			-0.049 (0.062)	-1.531 (0.422)***	-0.085 (0.072)	-1.116 (0.482)**
Employment density, 1992 ('000)	0.001 (0.001)	0.001 (0.005)			-0.001 (0.001)	-0.005 (0.004)	-0.001 (0.001)	0.004 (0.007)
Percent adults 25 + with bachelor's degree, 1990, county	0.027 (0.105)	0.624 (0.563)			0.164 (0.131)	1.276 (0.428)***	0.138 (0.107)	0.385 (0.791)
Zone designation year (# years after 1986)	0.000 (0.001)	-0.003 (0.003)			0.001 (0.002)	-0.030 (0.003)***	0.002 (0.002)	-0.027 (0.008)***
Marketing (from survey: 1-5 scale)			0.007 (0.006)	0.045 (0.047)	0.007 (0.007)	0.064 (0.022)***	0.009 (0.005)	-0.017 (0.035)
Amending zoning (from survey: 1-5 scale)			0.001 (0.005)	-0.043 (0.037)	0.002 (0.006)	-0.098 (0.024)***	-0.001 (0.002)	-0.071 (0.033)**
Training workers (from survey: 1-5 scale)			-0.004 (0.002)	0.020 (0.038)	-0.002 (0.002)	0.127 (0.036)***	-0.001 (0.002)	0.137 (0.046)***
Facilitating earning tax credits (from survey: 1-5 scale)			-0.010 (0.005)**	-0.025 (0.046)	-0.014 (0.006)**	-0.060 (0.035)*	-0.013 (0.007)*	-0.048 (0.043)
Encouraging the building of additional infrastructure (from survey: 1-5 scale)			-0.005 (0.006)	0.001 (0.017)	-0.007 (0.005)	-0.012 (0.011)	-0.006 (0.004)	-0.027 (0.022)
Offering other tax incentives, credits or discounts (from survey: 1-5 scale)			0.002 (0.004)	0.029 (0.027)	-0.001 (0.006)	0.059 (0.017)***		
N	1300	962	1092	767	1092	767	1300	962

TABLE 7C. FIRST-DIFFERENCE VERSION OF 7B (SUBZONE DUMMIES DROP OUT)

	With control rings (1)	Without control rings (2)	With control rings (3)	Without control rings (4)	With control rings (5)	Without control rings (6)	With control rings (7)	Without control rings (8)
Enterprise zone	0.004 (0.002)**	0.029 (0.010)***	0.010 (0.004)**	0.059 (0.050)	0.011 (0.003)***	0.146 (0.027)***	0.005 (0.002)**	0.115 (0.029)***
Enterprise zone interacted with:								
Share of employment in establishments with < 50 employees, 1992	0.195 (0.088)**	0.302 (0.505)			0.089 (0.073)	-1.045 (0.627)	0.121 (0.091)	-1.214 (0.658)*
Share of employment in manufacturing, 1992	0.017 (0.055)	-0.019 (0.233)			0.064 (0.055)	-1.637 (0.429)***	0.009 (0.065)	-1.743 (0.516)***
Employment density, 1992 ('000)	0.001 (0.001)*	-0.001 (0.004)			0.000 (0.001)	-0.001 (0.004)	0.000 (0.001)	0.001 (0.006)
Percent adults 25 + with bachelor's degree, 1990, county	0.060 (0.094)	0.690 (0.491)			0.177 (0.090)*	0.863 (0.389)**	0.127 (0.088)	0.577 (0.488)
Zone designation year (# years after 1986)	0.000 (0.001)	0.001 (0.004)			-0.000 (0.002)	-0.033 (0.009)***	0.002 (0.001)	-0.030 (0.009)***
Marketing (from survey: 1-5 scale)			0.013 (0.006)**	0.020 (0.034)	0.008 (0.006)	0.060 (0.043)	0.012 (0.005)**	0.010 (0.043)
Amending zoning (from survey: 1-5 scale)			-0.003 (0.004)	-0.033 (0.047)	0.002 (0.004)	-0.109 (0.023)***	-0.003 (0.002)*	-0.097 (0.030)***
Training workers (from survey: 1-5 scale)			0.001 (0.003)	0.030 (0.045)	0.003 (0.002)	0.153 (0.039)***	0.004 (0.002)*	0.170 (0.055)***
Facilitating earning tax credits (from survey: 1-5 scale)			-0.011 (0.003)***	-0.017 (0.021)	-0.015 (0.005)***	-0.034 (0.029)	-0.015 (0.006)**	-0.043 (0.036)
Encouraging the building of additional infrastructure (from survey: 1-5 scale)			-0.006 (0.005)	0.003 (0.018)	-0.004 (0.005)	-0.024 (0.015)	-0.003 (0.004)	-0.041 (0.021)*
Offering other tax incentives, credits or discounts (from survey: 1-5 scale)			0.000 (0.004)	0.024 (0.026)	-0.003 (0.005)	0.030 (0.012)**		
N	1200	888	1008	708	1008	708	1200	888

TABLE 8. COLUMNS 5-8 AS IN KOLKO AND NEUMARK (2010)

	Shift in growth rate (using linear trend)			
	With control rings		Without control rings	
Evaluated at: Corresponding specification:	25th percentile Table 7, col (5) (5)	75th percentile Table 7, col (5) (6)	25th percentile Table 7, col (6) (7)	75th percentile Table 7, col (6) (8)
Effect of enterprise zone evaluated at 25th and 75th percentiles of:				
Share of employment in manufacturing, 1992	0.014 (0.003)***	0.006 (0.005)	0.031 (0.029)	0.010 (0.021)
Marketing (from survey: 1-5 scale)	0.003 (0.008)	0.018 (0.006)**	-0.004 (0.030)	0.043 (0.040)
Facilitating earning tax credits (from survey: 1-5 scale)	0.030 (0.009)***	0.003 (0.004)	0.031 (0.033)	0.020 (0.023)
N	1092	1092	767	767

TABLE 8B. SAME AS TABLE 8A, BUT WITH THE MODIFIED TREND

	Shift in growth rate (using years since subzone designated)			
	With control rings		Without control rings	
Evaluated at: Corresponding specification:	25th percentile Table 7, col (5) (5)	75th percentile Table 7, col (5) (6)	25th percentile Table 7, col (6) (7)	75th percentile Table 7, col (6) (8)
Effect of enterprise zone evaluated at 25th and 75th percentiles of:				
Share of employment in manufacturing, 1992	0.014 (0.004)***	0.008 (0.005)	0.166 (0.040)***	-0.014 (0.027)
Marketing (from survey: 1-5 scale)	0.004 (0.009)	0.018 (0.007)***	0.023 (0.038)	0.151 (0.030)***
Facilitating earning tax credits (from survey: 1-5 scale)	0.031 (0.009)***	0.004 (0.005)	0.185 (0.067)**	0.064 (0.024)**
N	1092	1092	767	767