Do Science Parks Generate Regional Economic Growth?
An Empirical Analysis of their Effects on Job Growth and Venture Capital

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Executive Summary

Agglomerations, or “clusters,” of industries—and especially of high-technology industries—can be major sources of economic growth. Policy makers therefore often search for ways to catalyze such clusters. A popular approach is to establish a science or research park in the hopes that it will attract companies and fuel regional economic growth. In this paper I assemble a county-level panel dataset to explore the effects of science parks on job growth and on venture capital. Non-parametric and econometric analysis reveals no positive effect of science parks on regional development overall. In other words, while success stories do exist, the analysis suggests that successes are the exception rather than the rule. Thus, policies intended to promote cluster development by subsidizing science or research parks are unlikely to be effective.
Do Science Parks Generate Regional Economic Growth?  
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1. Introduction

Policy makers around the world are anxious to find tools that will help their regions attract high-tech jobs and become centers of innovation and new technology. During the late 1990s this meant trying to emulate Silicon Valley. The dot-com crash put an end to those hopes, which have now morphed into a desire by officials in many regions to become biotech hubs. For example, Florida announced plans in late 2003 to give more than $500 million in subsidies to the Scripps Research Institute to build a research facility in Palm Beach County; Virginia officials urged a county to give the Howard Hughes Medical Institute a break on property taxes to make the state appear biotech-friendly; and the city of Baltimore is hoping that a planned city-subsidized plan will remake a run-down neighborhood into a thriving biotech center.¹ Local officials generally hope that with the right ingredients they can create a “cluster” of high-technology activity that, in a virtuous circle, will attract more people and businesses.

Unfortunately, while we have learned a great deal about firm clustering, the composition of clusters like Silicon Valley, and the various components of successful high-tech regions, there is little empirical evidence on the effectiveness of public policies intended to start these clusters from scratch. In this paper I use U.S. county-level panel data to investigate the effects of research parks on job growth and on venture capital. I take two empirical approaches to test the regional effect of the parks. First, I match counties with research parks to “similar” counties without parks and compare them over time (in the spirit of Goldstein and Luger (1991a), discussed below). Second, I test econometrically the effect of establishing science parks. I find no evidence that research parks had any measurable economic impact, suggesting that public subsidies to these ventures were not wise investments.

2. Industrial clustering

It is well known that many industries concentrate regionally (e.g., Krugman 1991a, 1998, Porter 2003) and that this clustering is greater than would be expected if geographic distributions were random (Ellison and Glaeser 1997). Industry agglomeration is not limited to high-technology sectors. In the early nineteenth century, U.S. manufacturing was concentrated in a small part of the Northeast and the Midwest. Historically, shoes were produced in Massachusetts and rubber in Akron, Ohio. Carpet producers are still disproportionately located in Dalton, Georgia, and jewelry producers are Providence, Rhode Island (Krugman 1991a). Today, high-tech firms concentrate in areas like Silicon Valley.

Alfred Marshall in 1920 hypothesized three reasons for industrial clustering: benefits of a pooled labor supply, access to specialized inputs, and information flows between people and firms.2 These features may generate a positive feedback loop, in which firm concentration brings additional labor and other inputs, encouraging additional firm concentration, and so on (e.g., Arthur 1994, Krugman 1991b). The specialized inputs required for industrial concentration differ by industry, of course. It is by now conventional wisdom that universities and venture capital are necessary components of any high-tech agglomeration.

Universities not only draw scientists and engineers to a region, but also generate knowledge that nearby firms can use. Indeed, there is evidence of knowledge spillovers between firms and universities. Jaffe (1989) finds that university research positively impacts patenting by firms in the same state. Anselin, et al. (1997) find evidence of the same spillovers at a smaller regional level using a more sophisticated spatial analysis. Saxenian (1994), meanwhile, documents the importance of knowledge transfer between Stanford University and firms in Silicon Valley. The existence of these knowledge spillovers suggests that universities are important components in the virtual circle of high-tech agglomerations.

Venture capital, too, is an important component of a high tech agglomeration. Venture capitalists, though, may be as important as the capital itself, screening business plans and providing management advice to funded firms (Gompers and Lerner 1999).

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2 Indeed, the study of regional economies and industrial clustering has experienced cyclical popularity over the past century (McCann and Sheppard 2003).
A large high-tech labor force, a combination of large firms and new start-ups, venture capital, venture capitalists, infrastructure that supports high tech needs (e.g., a good fiber optic network), and university connections are all important or perceived as important components of high tech regions. This observation often leads to the view that these are just “ingredients” that, once in place, will generate a new Silicon Valley or biotech hub. Some of these ingredients may appear amenable to quick policy interventions and are attractive to politicians who want to promote regional economic development and desire immediately visible outcomes. Policy makers sometimes believe that they might be able to create a nucleus of, and catalyst for, such a cluster by helping establish a science or research park.

Research Parks

Research parks remain popular. The Association of University Research Parks (AURP) counted 135 parks in the U.S. as members in its 1998 directory, while the International Association of Science Parks has members in 82 countries outside the U.S. By 2003, the AURP had more than 200 members. Figure 1 shows the growth in the number of science parks in the U.S. from the first parks in the 1950s through the end of the 20th century.

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3 AURP defines a research park as “a property-based venture which has: Existing or planned land and buildings designed primarily for private and public research and development facilities, high technology and science based companies, and support services; a contractual and/or formal ownership or operational relationship with one or more universities or other institutions of higher education, and science research; a role in promoting research and development by the university in partnership with industry, assisting in the growth of new ventures, and promoting economic development; [and] a role in aiding the transfer of technology and business skills between the university and industry tenants.” See http://www.aurrp.org/whatis/index.html (accessed January 8, 2004). The International Association of Science Parks lists countries in which it has members and other information: http://www.iaspworld.org/ (accessed January 8, 2004).

4 The number of parks that closed, if any, is not clear. The organizations that track parks are also advocacy groups and are not eager to highlight failures.
generally established with two primary objectives. The first objective is “to play an incubator role, nurturing the development and growth of new, small, high tech firms, facilitating the transfer of university know-how to tenant companies, encouraging the development of faculty-based spinoffs and stimulating the development of innovative products and processes.” The second objective is to be a catalyst for regional economic development—a “growth sector leading the area . . . into a spiral of propulsive expansion.”

Most science parks receive some form of public subsidy. Goldstein and Luger (1991a) note, “many parks are public corporations or subsidiaries of public universities. Others are privately owned but may receive various types of government subsidies including land, buildings, services and infrastructure, and property tax reductions. Less direct government subsidies to science/technology parks can be through the provision of specially designed economic development, education, and job training programs, at the state level, and through favorable land-use policies which favor expansion, at the local level.” Notably absent from the literature on science parks, however, is any real discussion of their costs or estimates of public expenditures on them.

Some science parks have been successful. The Research Triangle Park (RTP) in North Carolina, for example, has been considered a success for some time (e.g., Braun and McHone 1992, Goldstein and Luger 1991b). RTP currently hosts 38,500 full-time employees and 131 organizations. Success stories like this, along with a few others such as the Stanford Research Park in the heart of Silicon Valley, encourage others to build parks in the hopes of emulating that success. Even if a science park itself is successful, however, that success may not spill over into the local economy. While the Research Triangle region now exhibits many features of a high tech area, RTP had not stimulated a regional technology cluster even by the early 1990s, despite having been established in 1959 (Braun and McHone 1992).

Success stories like RTP seem to be more the exception than the rule. For example, San Antonio broke ground on its Texas Research Park in the mid-1980s among predictions of hosting 50,000 jobs and generating another 100,000 spinoff jobs within 30 years (Haines-Saine 1985). While it has not been that long yet, it does not look promising: about 300 jobs so far (Hundley

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6 See, for example, Hillner (2000) who ranked the Research Triangle among the 46 “locations [in the world] that matter most in the new digital geography” in the July 2000 issue of Wired.
A research park established in Prince George’s County, Maryland, in the mid-1980s promised 12,000 jobs on the park and 25,000 related spinoff jobs (PR Newswire 1988). A local council member recently called that park a “failure,” and the state of Maryland wants a refund on some of the millions of dollars it invested in the site’s infrastructure (Wilen 2003).

A possible explanation for the few examples of “science park-led local economic development” (Felsenstein 1994), is that, as Jowitt (1991) observes, research parks are often just a political quick fix to industrial decline. Indeed, policy makers in regions experiencing economic downturns (either absolutely or relative to other regions) are likely to face pressure to generate economic development. A science park may be a politically attractive option since it can be constructed relatively quickly, generating at least an appearance of economic development activity. It can further generate an appearance of success when firms move into the park. Cities and research park organizations routinely count as “success” any firms or employment in the park, with no regard to whether that economic activity was new to the region or simply relocated into the park, and no analysis of whether that activity would have been likely to occur without the park. Moreover, as noted above, the costs of the park (many of which might be hidden, such as the opportunity cost of the land) are rarely calculated. In other words, cost-benefit analyses of research parks are likely to count as benefits any economic activity in the park regardless of whether it is, in fact, a net benefit, and ignore the costs altogether.

In order to generate economic growth, a science park would have to encourage firm growth that would not have happened without the park or generate spillovers that would otherwise be absent. The first criteria would be difficult and data-intensive to answer; to my knowledge no study explores it comprehensively. Still, some research explores differences between firms on and off science parks, and other research explores potential links between parks and their surrounding communities. A small body of additional research looks for regional effects of these parks.

There is some evidence that firms located in science parks differ from firms located outside the parks (but in the same region). Braun and McHone (1992), for example, found that firms in the Central Florida Research Park were more likely to be branch plants than firms outside the park. Ferguson (1999) found that firms in Swedish science parks tended to be younger and smaller than firms outside the park. But differences between firms on and off the

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7 And in a global sense, the park has an impact only if firms do not simply relocate from one place to another.
parks are to be expected and by itself this phenomenon is difficult to interpret. Parks may have selection or investment criteria, for example, ensuring that they host only particular types of firms. While the selection mechanism or incentives offered may attract particular types of firms, the differences among firms, per se, does not imply an economic effect of the park.

Most research finds little, if any, real effects of research parks. Felsenstein (1994) finds little evidence that firms in science parks engage in more research, have stronger linkages to universities, or witness greater transfers between other local firms than do firms not located in science parks. Indeed, he concludes that the evidence suggests “parks may function as ‘islands’ of innovation or as collections of firms with no real links between them.” Braun and McHone (1992) note a lack of linkages between firms in science parks and local economic actors outside the park. Spillovers to the larger region are probably less likely without such linkages.

While the results discussed above suggest it is unlikely that science parks have positive regional effects, there is scant evidence on this matter. Goldstein and Luger (1991b) provide the only evidence to date on this score. They matched U.S. counties with science parks to “similar” counties without science parks and compared total county employment growth rates before and after the park was established. Of the 45 parks in their sample 32 were in counties that grew faster than the matched counties, and 26 of the 45 grew more than 20 percent faster than the matched counties. Still, it is difficult to interpret these results since the analysis—despite the matched sample—does not control for other factors that could influence economic growth, and the authors provide little information on how they chose their control counties.

I build on this work by updating and greatly expanding the dataset to include far more measures of a high-tech economy over a longer period of time. In addition, I conduct more rigorous econometric tests that attempt to control for reasons parks may have been established in the first place. I discuss the data, methods, and analysis below.

3. Data

The county-level data I analyze in this paper come from a variety of sources and cover 1988-1997, though the time period covered varies by data source. Venture Capital data comes from VentureXpert, a database compiled by Venture Economics.8 Again, these data are provided

8 See Gompers and Lerner (Gompers and Lerner 1999) for a description of the Venture Economics data.
at the firm level, along with address and deal amount. The VC data includes information from 1983 through 1999. University data comes from the National Science Foundation’s CASPAR database. This database provides information on all U.S. universities, including an address. The firm and university addresses allow me to aggregate this data into counties.9

Employment data and firm counts by industry come from the U.S. Census Bureau County Business Patterns. While I have this industry data back to 1986, the 1987 changes to the Standard Industrial Classification (SIC) mean that time series analyses using these data should begin in 1988. Population estimates, government and military employment, and per capita income are available from the Department of Commerce Bureau of Economic Analysis Regional Economic Information System (REIS). I have these data from 1983-1997. These sources all provide data at the county level.

The policy variable of interest in this paper is whether a county established a research or science park. This information comes from the Association of University Research Parks, which compiled this information in its 1998 directory. A park may affect a region in many ways, but I look at three in particular: high-tech employment, firms, and venture capital. I discuss these in more detail below.

**High-tech Firms and Employment**

Because one objective of this paper is to look for impacts on regional technology development, I need a measure of employment in technology-related industries in addition to total employment. County Business Patterns provides data down to the four-digit SIC level, allowing me to construct such a measure. As many authors have noted, however, at least two problems arise in defining “technology industries.” The first is simply that the term itself is ambiguous. Almost all industries use and even develop advanced technology to some extent, making any definition of “high-tech” at least somewhat arbitrary. The second is that the Standard Industrial Classifications, even at the four-digit level, are fairly crude and do not accurately classify firms—especially large, multiproduct firms. Nonetheless, following other authors, it is possible to construct a crude definition of technology firms.

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9 I employed a computerized geographic information system (GIS) to aggregate firm and university data into counties. The GIS reads in the observation’s zip code and matches it to the county containing that zip code. Occasionally zip codes overlap counties; in these cases the GIS uses the centroid of the zip code to identify a county.
I begin with DeVol’s (1999) definition, which “includes industries that spend an above-average amount of revenue on research and development and that employ an above-average number of technology-using occupations—such as scientists, engineers, mathematicians, and programmers.” Table 1 lists the industries that comprise “high-tech” in this paper. While a reasonable definition, it includes many industries that deal primarily with military research and manufacturing (e.g., guided missiles).

Military spending has historically had a large impact on technology development—both in the technological direction and geographic location of R&D. However, changes in employment related to military R&D are driven largely by exogenous factors—the end of the Cold War, for example, brought about dramatic reductions in all areas of military spending, while the war on terrorism and in Iraq are now increasing military spending. While the effects of changes in military-related employment are interesting to study, including those changes in an aggregate measure of employment clouds the picture of regional changes in technology employment.

I thus calculate an alternate measure of high-tech employment excluding three industries: aircraft and parts (SIC 372), guided missiles and space vehicles (SIC 376), and search, detection, navigation, and guidance equipment (SIC 381). This variable should measure non-military high-tech employment.

<table>
<thead>
<tr>
<th>SIC</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>283</td>
<td>Pharmaceuticals</td>
</tr>
<tr>
<td>357</td>
<td>Computer and Office Equipment</td>
</tr>
<tr>
<td>366</td>
<td>Communications Equipment</td>
</tr>
<tr>
<td>367</td>
<td>Electronic Components and Accessories</td>
</tr>
<tr>
<td>372</td>
<td>Aircraft and Parts</td>
</tr>
<tr>
<td>376</td>
<td>Guided Missiles and Space Vehicles</td>
</tr>
<tr>
<td>381</td>
<td>Search, Detection, Navigation, and Guidance</td>
</tr>
<tr>
<td>382</td>
<td>Laboratory Apparatus</td>
</tr>
<tr>
<td>384</td>
<td>Surgical, Medical, and Dental Instruments</td>
</tr>
<tr>
<td>481</td>
<td>Telephone Communications</td>
</tr>
<tr>
<td>737</td>
<td>Computer Programming &amp; Data Processing</td>
</tr>
<tr>
<td>871</td>
<td>Engineering, Architectural, and Surveying</td>
</tr>
<tr>
<td>873</td>
<td>Research, Development, and Testing</td>
</tr>
</tbody>
</table>

Industries in italics (372, 276, 381) excluded from some calculations to remove effects of military spending.

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10 DeVol’s (1999) definition also includes SIC 781, motion pictures and allied services. I exclude this industry from my analysis because it seems to have been included in the DeVol study largely because of its concentration in Los Angeles rather than its role as a “high-tech industry.”
Venture capital

As mentioned above, the venture capital data comes from Venture Economics, which collects and disseminates data for the National Venture Capital Association. Because “venture capital” is, in general, so difficult to define, aggregated estimates of VC funding can differ depending on the source of the data. Venture Economics has one of the broadest definitions of “venture capital,” including not only venture funds but also “other private equity funds.”\footnote{See \url{http://www.ventureeconomics.com/methodology.html#6} for a description of Venture Economics’ data sources.} The result is that Venture Economics data yields the largest estimates of aggregate VC funding. For example, Venture Economics reported total venture funding in 1998 of $19.2 billion, PriceWaterhouseCoopers reported $14.2 billion, and VentureOne reported $12.5 billion.\footnote{See \url{http://www.ventureeconomics.com/news_ve/1999VEpress/VEpress02_08_00.html}, \url{http://www.pwcmoneytree.com/pdfs/reportq499.pdf}, and \url{http://www.ventureone.com/research/venturedata/stats/q498news.htm} for the Venture Economics, PriceWaterhouseCoopers, and VentureOne data, respectively.} Fortunately, while levels differ by source, changes over time and differences across regions do not. As such, an analysis that makes use of the variance across time and regions, as this paper does, should not be greatly affected by data source.\footnote{Unfortunately, I cannot test this claim rigorously. Venture Capital data is costly, and using it labor-intensive, making it extremely difficult to directly compare all the sources.} Nonetheless, I partially address this issue by removing from the VentureEconomics data all “non-high technology” (i.e., those listed as “consumer-related” or “other”). This deletion brings the VC data closer to other estimates (the 1998 total drops to $17.2 billion) and is more in line with the technology focus of this paper.

4. Empirical tests

Investigating the effects of relatively small policy interventions is difficult with aggregated data—even at the county level. I take two different approaches for exploring the data. While problems exist with each approach, the similarity of the results lends some robustness to the final conclusions.

First, I match “treatment” counties—those that built research parks—with similar counties without the policy intervention and compare changes in high-tech employment and venture capital over time. While matching counties in this way is imprecise at best, it provides a
first rough cut of the effects of these policy prescriptions. Second, I conduct a more rigorous regression analysis.

The first approach to exploring the effects of science parks is to match counties that built parks to similar counties that did not, much in the spirit of Goldstein and Luger (1991b). My analysis differs from theirs, however, in several ways. First, they looked only at changes in total county employment, while I look at high-tech employment and also venture capital. Second, I define “similar” in a precise way, while how they chose matches is not clearly defined. Finally, a decade has passed since they completed their work; it is time for an update.

For each county that built a research park, I attempted to identify similar counties that did not. I considered a county to be a control if its population, high tech employment, and venture capital were all within 30 percent of the levels for the treatment county in the year that it built the park. This definition yielded matches for 41 counties that opened parks from 1986 onwards (though because of the SIC changes I compare employment changes only for the 26 counties that opened a park in 1988 or later). Several counties yielded only one match, while one county, Gallatin, Montana, with its Advanced Technology Park, yielded 147 matches.

Appendix tables 1 and 2 show high-tech employment and venture capital, respectively, in the treatment and control counties in the year the park was established and five years later. The tables reveal little difference between the groups. The number of high-tech jobs increased, on average, from 5814 to 6283 in the 27 treatment counties, and from 5184 to 6723 in the control counties. Venture capital increased from about $5.7 million to $6.8 million on average in the 41 treatment counties, and from about $5.0 million to $10.9 million in the control counties. Nine of the treatment counties ended up with more venture capital than their controls, and in eight cases both the treatment and control counties attracted no venture capital.

Figure 2 and Figure 3 show means from five years before and to five years after park establishment for high tech employment and venture capital, respectively. The nature of the data means that each data point in the graphs cannot, unfortunately, be calculated over the same sample size. My employment data begins in 1988, meaning that I have no pre-park data when the park was established that year (and only one year of pre-park data when the park was established in 1989, and so on). Likewise, my data stops in 1997, meaning that I have no information for time $t+5$ for treatment counties and their controls after 1992 (and no information

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14 Because my data starts in 1986, the analysis excludes any county that built a park before that year.
for time $t+4$ after 1993, and so on). Despite their statistical shortcomings, the figures strongly suggest no substantial differences between the treatment counties and their controls.

While the tables and figures are compelling, they are not, by themselves, entirely convincing. In addition to the data issues discussed above, matching counties based on a few variables cannot control for the many other ways in which counties differ. To look at this question more rigorously I estimate equation (1) below, first only with the counties that established parks to investigate the before-after effects of the park, and then including the control counties.

\[
Y_{it} = \beta_0 + \gamma_t + \alpha_j + \beta_1 \text{(Science park dummy }i_t) + \beta_2 Z + \epsilon_{it}
\]

I estimate Equation (1) three times, each time using a different dependent variable. I first define $Y_{it}$ as high-tech non-military employment in county $i$ in year $t$, next as venture capital in the county-year, and finally as the number of small high-tech firms in the county-year. The science park dummy equals one if there is a science park in that county-year, and
zero otherwise. \( Z \) is a vector of independent variables that are potentially important components of regional development. Continuous independent variables that vary across county and time include university R&D spending, personal income, non high-tech employment, the number of large high-tech firms not primarily engaged in military activities, and the number of large high-tech firms engaged primarily in military related activities, where “large” is defined as a firm with more than 500 employees. Finally, I control for year \((\gamma_t)\) and county \((\alpha_j)\) fixed effects. I explain the rationale for each variable’s inclusion below.

Considerable evidence suggests that universities are important components of a region’s economy. For example, Jaffe (1989) finds spillovers from university research at the state level, while Saxenian (1994) notes Stanford’s key role in Silicon Valley. I include university R&D spending in the county both to control for the presence of a research university and also to test their effects in this context. Personal income proxies for wealth and cost of living. Non high-tech employment controls for general (non high-tech) economic conditions and size of the labor force.

I include counts of large high-tech firms since they are important determinants of regional technology development but are less likely than small firms to move to a region because of a science park.\(^{15}\) Indeed, newer research parks (those that opened in the time period in this sample) aim to attract primarily small high-tech firms. Several authors have noted the importance of the initial conditions in determining the growth trajectory of a region (e.g., Arthur 1994, Krugman 1995). The county fixed effects help control for such initial conditions as well as county specific, but otherwise unobserved, features that are likely to affect technological development. Year fixed effects control for time trends, which could otherwise contribute to spurious correlations.

\(^{15}\) With some exceptions, of course. RTP now hosts several large firms, including Glaxo Wellcome and IBM. However, RTP is an exception as one of the few very large and successful parks.
Tables 2 and 3 highlight the results of this analysis. Table 2 shows the results when estimating the equation using only the counties that established science parks in order to get a sense of the before-after effects. Within these counties, the analysis reveals that the number of large non-military firms is positively and significantly correlated with high-tech employment, negatively and significantly correlated with high-tech venture capital, and not statistically correlated with the number of small high-tech firms. The number of large military-focused firms is weakly positively correlated with the number of small high-tech firms. The number of government employees in the county is positively correlated with the number of small high-tech firms. The number of government employees in the county is positively correlated with the number of small high-tech firms, negatively correlated with venture capital, and positively correlated with the number of small high-tech firms.

The coefficient of interest is on the research park dummy variable. Recall that in this case the dummy variable equals zero before the county established the park and one afterwards. The coefficient, while negative, is not statistically significant, suggesting that establishing the science park had no measurable impact on the number of high-tech jobs, venture capital, or the number of small firms in the county.

### Table 2

<table>
<thead>
<tr>
<th>dependent variable</th>
<th>number of high-tech jobs</th>
<th>high-tech VC</th>
<th>number of small high-tech firms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mean of dependent var:</strong></td>
<td>9226</td>
<td>5338</td>
<td>307</td>
</tr>
<tr>
<td><strong>Science park?</strong></td>
<td>-110.118</td>
<td>-967.370</td>
<td>-11.945</td>
</tr>
<tr>
<td>University R&amp;D spending</td>
<td>0.005</td>
<td>0.009</td>
<td>0.000</td>
</tr>
<tr>
<td>non-tech employment</td>
<td>0.001</td>
<td>0.164</td>
<td>0.0008</td>
</tr>
<tr>
<td>personal income</td>
<td>0.788</td>
<td>1.260</td>
<td>0.060</td>
</tr>
<tr>
<td>num large non-military firms</td>
<td>818.167</td>
<td>-1,589.503</td>
<td>2.614</td>
</tr>
<tr>
<td>num large military firms</td>
<td>-662.339</td>
<td>-2,009.042</td>
<td>16.476</td>
</tr>
<tr>
<td>government employment</td>
<td>0.223</td>
<td>-0.789</td>
<td>0.008</td>
</tr>
<tr>
<td>Constant</td>
<td>-11,368.250</td>
<td>6,586.608</td>
<td>-649.597</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>672</td>
<td>672</td>
<td>672</td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
<td>0.38</td>
<td>0.20</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Absolute value of t statistics in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Year and county fixed effects included in all regressions
Table 3 incorporates the control counties, which allows us to compare how the science park counties performed relative to the other counties once they established their parks. In this case the table shows that university R&D spending has a positive and statistically significant correlation with the number of high-tech jobs and the number of small high-tech firms, consistent with research that has demonstrated local spillovers of university research.

The science park dummy variable here turns out to be statistically significant and negatively correlated with the number of high-tech jobs and venture capital. It is positively correlated with the number of small firms, but is not statistically significant. In other words, the results here suggest that counties that established science parks actually did worse—on average and all else equal—than the counties that did not establish the parks. In sum, the econometric results match the nonparametric results: there is scant evidence that establishing a research park aided regional development.

### 5. Conclusion

Industrial clusters of economic activity are real and can be major sources of economic growth. While this has been true for a long time, since the 1980s clusters of high-technology activity have gotten the most attention, culminating in the late 1990s with a focus on Silicon Valley and today on biotech hubs like San Diego. Politicians are attracted to the idea of clustering because they are attracted by the idea that with the right “ingredients” their region can...
become another such cluster. One common technique for trying to catalyze such growth is to establish or subsidize a research park.

This paper uses a host of county-level panel data to test whether such plans tend to be effective. This paper is not, of course, the final answer. Investigating all the effects of science parks requires data disaggregated below the county level. A more detailed analysis would determine whether firms and other organizations moved into the park (which might be an indicator of park success), whether they simply moved from one location within the region to another (which would mean no net regional impact), and—importantly—calculate the costs of the park.

Nonetheless, this analysis suggests that establishing a research park tends to have no net impact on job growth, the number of firms, or on the amount of venture capital attracted to the county. That is, while there are successful research parks, they seem to be the exception rather than the rule. These results are consistent with Porter’s (2003) conclusion that it is difficult to start new regional clusters from scratch. While high tech clusters can be major sources of economic growth, and industrial clustering is common, the results in this paper suggest that research parks are not, in general, likely to help generate one, and that subsidies spent on them are likely to be ineffective.
References


Hundley, Kris. "Boom or Bust?" *St. Petersburg Times*, November 24 2003.


