

# Dynamic Urban Economies: Consistent Business Generators in the American Next Wave

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*This research investigates the recent evolution of the US economy by focusing on the geography of development among the firms that form the leading edge of change in the country – the group of “next wave” businesses that lead the nation in revenue growth rate. These businesses are important because their rapid growth is a signal that each business has gained some insight or edge that is driving their growth. Using three study questions, focusing on dispersion, regional development, and consistency, this study provides a profile of the recent evolution of the spatial distribution of next wave activity across the US. The dispersion results show that, although the geographic distribution of next wave firms is gradually becoming more like that of establishment firms, next wave businesses remain more widely spread, especially at the county level of analysis. The regional development results, focusing on a trend analysis of next wave firm location by county nationwide, further substantiate this “opportunity spread” finding by showing that many of the leading counties in terms of next wave growth are only minor business centers by any other measure. The consistency analysis concludes the study by showing the highly selective nature of the distribution of counties that most reliably produce and host next wave firms throughout the study period.*

*Keywords:* Next wave firms, United States, regional economic development.

Regional economic development is a topic of broad concern in modern society. Businesses are interested in understanding regional development trends and patterns, as these impact the growth prospects and opportunities for firms themselves. Governments are interested in economic development because political fortunes are often tied closely to the state of the economy. Individuals are concerned with changing economic conditions as these relate to individual career and financial prospects. From this broad perspective, gaining a better understanding of the dynamics of regional economies, including an improved knowledge of how firms develop, grow, and have an impact on the regions in which they operate, is important for the ad-

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vancement of economic geography today.

This paper studies the location and dynamics of a group of firms known collectively as the “next wave” (Rice, 2004, 2005, 2006; Rice and Lyons, 2007). Next wave firms are the most rapidly growing of all businesses. The fact that such firms are expanding quickly is a signal that they have gained some insight or edge that is driving their growth. The existence of such an innovation, coming perhaps in the form of a lab-based technological development, but perhaps also in the form of a new financial model or a marketing insight, is acknowledged and rewarded by the market in terms of sales and job growth. Instead of associating this innovation with high-technology development only, a more appropriate means of conceptualizing such activity would be to connect it with the idea of “creativity” (Florida, 2002).

This work examines the geography of next wave firm activity in the US by investigating three basic research questions. First, are new geographies of economic development continuing to emerge with the development of next wave firms? The locational distribution of next wave firms is especially important when considered concurrent with the geography of large, established firms. Second, to what extent do northeastern cities, in the traditional manufacturing belt, participate in the development of the next wave? This area of investigation compares the role of “Rustbelt” and “Sunbelt” locations as growing or declining hosts of firms in the evolution of the next wave group of companies. Third, which are the most *consistent*, year-after-year, regional generators of next wave firms in the US? Aside from considering sheer numbers of next wave firms, as is involved in the first two questions, this final question focuses on the ongoing evolutionary processes that characterize next wave development. Answers to these and related questions can contribute to our understanding of the development of the next wave, both on its own and as an agent of change within the larger, national economy.

## RELATED LITERATURE

### *Location analysis in Economic Geography*

Previous advancement in the field of business location analysis forms the foundation for the present study. Investigation into the location of economic activities has occupied geographers and regional scientists for decades. Location analysis as a geography sub-discipline began to flourish in the quantitative revolution of the late 1950s and the 1960s, with geographers such as Garrison, Marble, Berry and the “space cadets” playing central roles (Barnes and Farish, 2006). However, initial progress in the field of business location analysis reaches back much further, encompassing the initial investigations of von Thünen (1826), Weber (1909), Hotelling (1929), and Christaller (1933). The example of observation and theory-building provided by these early writers laid a foundation that others developed more fully

in the decades after.

Location analysis in and around the period of the quantitative revolution focused on the development of theories for businesses operating in a variety of economic sectors. Researchers such as Dunn (1954), Isard (1956), Rawstron (1958), and Bunge (1962) contributed to the location analysis of economic activity with the development of agricultural, industrial, and service location theories that approached explanation and prediction from a positivist perspective (Barnes, 1987). Such location-theoretic development focused on the activities of greatest importance to the economies of the developed world at the time, beginning with primary (extraction, harvest), secondary (processing, manufacturing), and tertiary (distribution, retail) activities. However, as the global economy has continued its development, new issues and activities have become central to economic geography that were not as prominent in the early years of the location analysis field. Alternative theoretical perspectives sought to address inadequacies in the positivist approach, and a broader range of activities, such as producer services and corporate structure, were introduced as focal points for new research and theoretical development.

Among the extensions brought into the location analysis tradition in the post-1960s period was the recognition of corporate decision-making functions, such as headquarters and regional offices, as activities worthy of a focused body of location explanation (Semple, 1985). Weber's (1909) ground-breaking industrial location work actually included the formulation of a concept, the "central organizing stratum", that encapsulated this branch of the field, but it was not until the 1970s that a concerted effort emerged to explore the geography of corporate headquarters and related activities. Hymer (1972) conceptualized the modern corporation as being comprised of different levels of activity, with each level having a distinct spatial configuration. Hymer proposed that the highest of these functional levels consist of top management and overall planning, located for the largest and most dominant corporations in the elite cities of the globe. Since the 1970s, numerous geographic studies have examined the evolving locations and spatial distributions of headquarters and other, high-level corporate activities (Semple, 1973; Martz and Semple, 1985; Holloway and Wheeler, 1991; Lyons, 1994; Meyer and Green, 2003; Rice, 2006). Although Semple (1985) proposed a stage-model explanation of the spatial evolution of corporate headquarters city systems, geographers continue to search for improved theoretical frameworks for a more comprehensive understanding of corporate headquarters and their location patterns and trends.

### *Rapidly-Growing Firms*

One specific aspect of the evolving inter-urban system of corporate activities and linkages that has attracted attention in recent years is the location of rapidly-growing, innovative firms. Wheeler (1990) provided the pioneering study of these firms, focusing on the Inc 500 annual compilation of the fastest-growing private companies in the US. Wheeler's analysis, extending from 1978 to 1987, provided

the initial indication that these expanding firms are characterized by a geography that is distinct from the location distribution of large, established firms. Specifically, this work showed a fast-growing firm bias toward Sunbelt and suburban locations. Wheeler also observed that this group of firms also had a greater orientation toward the service sector than is typical of establishment firms. This initial analysis demonstrated that rapidly expanding firms are distinct in characteristic and behavior, and are important focal points for analysis as geographers continue to improve their understanding of the economy as a whole.

Lyons (1995) continued this line of investigation by updating and extending on Wheeler's original findings. Lyons' analysis examined the Inc 500 group of firms for the period 1982-1992, demonstrating that the trend toward suburbanization and Sunbelt locations continued, with the traditional economic heartland of the Northeast being much less important among Inc 500 firms than among the largest firms in the country. However, this research also provided more detail on the spatial character of this dynamic economic activity. Lyons showed that the geographic pattern of Inc 500 firms is highly complex: even though the South and West as a whole led in Inc 500 growth, certain western and Sunbelt metropolitan areas were centers of Inc 500 growth, while others in the same regions experienced no growth, or even an absolute decline in Inc 500 firms hosted. Additionally, Lyons' analysis also demonstrated that Inc 500 firms were largely concentrated in industries that were fast-growing themselves – a result that Lyons took to be indicative of the role that Inc 500 firms are playing in the restructuring of the economy.

Most recently, Rice (2004, 2005, 2006; Rice and Lyons, 2007) has also investigated rapidly growing firms, largely in a Canadian context. Rice's results have, in part, echoed the findings of Wheeler and Lyons for the US, showing that fast-growing firms have a suburban orientation and a concentration in some of the most dynamic components of the Canadian economy, such as electronics and software publishing. Rice's one US-based finding, from a comparative analysis of New York and Toronto, showed that New York played an important role in hosting Inc 500 firms from 1996-2004. However, New York's second ranking to Washington, DC nationally (in terms of number of Inc 500 firms hosted) contrasts with the metropolitan area's dominance as the country's large-firm head office leader. Again, this finding demonstrates the distinct dynamics that impact Inc 500 firm location, as opposed to the set of factors that affect the largest firms in the nation.

The present study uses the body of literature outlined above, related both to the general field of location analysis and to the specific study of fast-growing firms, as a foundation for further investigation of the recent evolution of the US space-economy. As already discussed, this research takes from Rice's work, cited above, the term "next wave" to refer to fast-growing firms in general. By doing so, this study attempts to contribute to the general study of the geography of fast-growing firms in the US as well as in other countries. The following section outlines the data, research questions, and findings arising from this inquiry.

## CASE STUDY: THE US NEXT WAVE

### *Data*

The national case study examined here focuses on businesses belonging to the US next wave. The study analyzes data extracted from *Inc* magazine's annual listing of the 500 most rapidly-growing private firms in the US, the *Inc 500*. Although this list has been published for well over two decades, to keep the study manageable in size and scope, the analysis completed here focuses on Inc 500 firms from the period 1996 to 2004. Since this time frame includes both a period of rapid economic growth (the late 1990s "dot com boom") and retrenchment (the post-2000 "dot com bust"), use of this interval for analysis assists in providing a balanced view of recent development in the national economy (Rice, 2006).

For additional perspective, the analysis also brings in data for the US "establishment", the 500 largest companies in the country as measured by annual revenues, for the same period. Inclusion of large-firm data provides a means of comparing the location and development of the next wave group of firms with a dataset that is more representative of business location within the economy as a whole. Data for establishment firms comes from the combined resources of *Dun and Bradstreet's* annual business ranking publication and the annual edition of the *LexisNexis Corporate Affiliations* database.

### *Results*

The first research question, termed here the *dispersion* question, examines whether next wave firms lead the establishment component of the economy in decentralizing the location of economic activity in the US. Previous research has shown that headquarters in the US urban system have followed a trend toward increasing decentralization over the past 50 years (Semple, 1973). However, the bulk of this past headquarters location research dealt exclusively with the establishment group of firms. As argued by Rice (2004, 2005; Rice and Lyons, 2007), next wave firms can provide insight into possible changes that may characterize the future orientation and spatial distribution of economic activity. Differences between the establishment and the next wave, if observed, could indicate the emergence of new geographies of economic development based on innovative, rapidly growing firms.<sup>1</sup>

Table 1 addresses this question by displaying spatial dispersion values for the national next wave and establishment in 1996 and 2004. The *dispersion index* used here is otherwise known as the relative entropy statistic (Berry and Schwind, 1969; Sui and Wheeler, 1993; Rice and Lyons, 2007).<sup>2</sup> Relative entropy has an extensive history of application in economic geography over the past four decades. The dispersion index as employed here measures degree of spatial spread on a 0 (total concentration) to 100 (total dispersion) scale. The table reflects the results of the dispersion calculations at two levels, state and county. Table 1 shows that all next

wave and establishment dispersion values increased from 1996 to 2004, indicating that the US urban system was increasingly characterized by greater spread among both establishment and next wave firms. The amount of change in the dispersion index is small, however, showing that the change ongoing through the study period was incremental, rather than revolutionary, in character. Next wave dispersion levels are consistently higher than establishment dispersion values, supporting the contention that fast-growing firms are leading their larger counterparts in distributing economic activity (slightly) more widely through the country.

**Table 1:** Dispersion indices for the US establishment and next wave, 1996-2004\*.

		Dispersion Index	
		1996	2004
By County	Next Wave 500	75.66	78.22
	Establishment 500	68.35	71.12
By State**	Next Wave 500	79.28	81.19
	Establishment 500	75.62	79.54

\* A dispersion index value of 0.0 would indicate complete concentration (i.e. all firms in one state/county), while a value of 100.0 would indicate maximal dispersion (i.e. all 500 firms located in 500 different counties out of the over 3,000 nationwide, or all 52 states/districts having an equal number of firms).

\*\* The 50 states, plus the District of Columbia and Puerto Rico.

Table 2 applies the information-theoretic concept of *information gain* (Johnston and Semple 1983; Wheeler 1990) to depict trends in the comparison of next wave and establishment locations, nationwide. Information gain provides a simple comparative statistic indicating how similar two spatial distributions are, with smaller values indicating higher degrees of similarity, and larger values indicating dissimilar distributions. The table shows that, at both the county and state levels of analysis, the next wave and establishment groups of companies moved toward greater spatial convergence from 1996 to 2004. The county-level information gain decreased more than its state-level counterpart (0.0492 compared to 0.0207), signifying that more location shifts occurred at a regional scale (i.e. within-state shifts, county-to-county) than at a wider scale (state-to-state rebalancing at a national level).

Table 3 provides a final perspective on the next wave versus establishment comparison in a simple listing of the top-ranking states by *size index* from 1996 to 2004. Size index is the mean number of firms hosted by each state, year-by-year over the study period, calculated for both the establishment and the next wave. This table reflects the distinct hierarchical geographies that continue to characterize the two groups of companies, as for example New York is the dominant leader for establishment firms, but ranks sixth among states for next wave companies. Massachusetts and Florida are among the top ten states for the next wave, but not for the estab-

lishment, while Ohio and Michigan appear on the establishment list. And, while eight states appear on both lists only Texas and Georgia achieve the same rank on both lists. Table 4 continues the same comparison, only at the county level, showing even more important differences. New York County's (Manhattan) size index is more than twice the size of second-ranked Harris County (Houston) among establishment firms, but New York does not even appear among the top ten counties nationwide for next wave firms. Only four counties (Harris, Cook, Los Angeles, and Dallas) appear on both lists and none of them achieve the same rank on both lists. Additionally, table 4 demonstrates that, by county, the geographic distribution of establishment firms includes much larger clusters than exists among next wave firms. Although Tables 1 and 2 show signs of increased similarity and common trends towards greater geographic spread among both the next wave and establishment, tables 3 and 4 demonstrate that key differences remain.

**Table 2:** Information gain comparison of the US establishment and next wave spatial distributions, 1996 and 2004.

	Information Gain*	
	1996	2004
Comparison by County	0.2746	0.2254
Comparison by State	0.2519	0.2312

\* Smaller values indicate more similarity in the two spatial distributions.

**Table 3:** Leading states by size index for the US establishment and next wave, 1996-2004.

Establishment		Next Wave	
State	Size Index	State	Size Index
New York	66.67	California	69.00
Texas	55.67	Texas	36.89
California	53.00	Virginia	29.67
Illinois	37.00	Florida	27.22
New Jersey	29.22	Massachusetts	25.22
Pennsylvania	26.78	New York	24.22
Ohio	24.11	Illinois	21.78
Michigan	17.11	Pennsylvania	20.44
Georgia	16.78	Georgia	19.89
Virginia	16.67	New Jersey	18.89



**Table 4:** Leading counties by size index for the US establishment and next wave, 1996-2004.

Establishment		Next Wave	
County (County Seat)	Size Index	County (County Seat)	Size Index
New York, NY (New York)	52.89	Los Angeles, CA (Los Angeles)	14.89
Harris, TX (Houston)	24.67	Middlesex, MA (Cambridge)	13.89
Cook, IL (Chicago)	24.11	Fairfax, VA (Fairfax)	13.00
Los Angeles, CA (Los Angeles)	18.67	Dallas, TX (Dallas)	12.88
Dallas, TX (Dallas)	15.11	Fulton, GA (Atlanta)	11.67
Hennepin, MN (Minneapolis)	11.67	Orange, CA (Santa Ana)	10.78
Fairfield, CT (Bridgeport)	9.78	Cook, IL (Chicago)	10.11
San Francisco, CA (San Francisco)	9.00	Harris, TX (Houston)	8.22
Santa Clara, CA (San Jose)	9.00	Montgomery, MD (Rockville)	7.89
Philadelphia, PA (Philadelphia)	8.22	Maricopa, AZ(Phoenix)	7.78

A second *regional development* question investigates the geographic focus of next wave regional business growth across the US. Previous research (Wheeler, 1990; Lyons, 1995) identified western and Sunbelt cities as primary generators of Inc 500 firms. The regional centre analysis updates these previous analyses to 2004 and identifies the most prominent regional focal points of next wave activity nationwide. Are Sunbelt cities continuing to lead in next wave firm creation, or are selected northern US cities also now playing important roles in this dynamic component of the economy? What cities or regions can be identified by a multi-year analysis as important, emerging regional producers of next wave growth?

Table 5 focuses on county trends in hosting of next wave firms. *Trend index* is the slope derived from a simple linear regression of number of firms, by county, versus time for the 1996-2004 study period. This trend analysis illustrates the unique and complex geographies being created by change in the next wave group of companies. Leading next wave growth counties with otherwise low economic profiles include Palm Beach, FL (West Palm Beach), Marion, IN (Indianapolis), and Utah, UT (Provo), while counties with the largest next wave declining trends include some major centers of national economic importance, such as the Santa Clara and Alameda counties in California (San Francisco Bay Area), DuPage and Cook counties in Illinois (metropolitan Chicago), and Dallas county in Texas (Dallas). The trend analysis indicates that next wave activity may be spreading economic opportunity beyond the traditional, large metropolitan area economic powerhouses since only San Francisco and Miami-Dade counties are the only counties associated with large metropolitan areas that make the top ten list.

The third and final *consistency* question examines the longitudinal profile of next wave cities. This analysis explores the ability of cities to produce and host fast-growing firms throughout the 1996-2004 study period. Research for this question iden-



tifies the counties that consistently host next wave firms, year after year. Based on previous work, the study expectation is that large urban centers, providing superior access to markets, suppliers, and other key resources, would encourage consistent next wave development (Rice and Lyons, 2007). In addition, centers in regions of the country that are themselves undergoing expansion, such as the Sunbelt, should be expected to host next wave firms on a highly-consistent basis.

**Table 5:** Top and bottom Counties by trend index for the US next wave, 1996-2004.

Top ten Counties by trend index, 1996-2004			
County	County Seat	Trend Index	Size Index
Palm Beach, FL	West Palm Beach	0.850	4.000
Marion, IN	Indianapolis	0.700	4.000
Utah, UT	Provo	0.667	2.889
San Francisco, CA	San Francisco	0.383	5.444
Multnomah, OR	Portland	0.383	4.000
Hamilton, OH	Cincinnati	0.383	2.889
King, WA	Seattle	0.367	6.889
Ada, ID	Boise	0.333	1.000
Clark, NV	Las Vegas	0.333	1.000
Miami-Dade, FL	Miami	0.317	2.444
Bottom ten counties by trend index, 1996-2004			
Leon, FL	Tallahassee	-0.417	1.556
Montgomery, MD	Rockville	-0.450	7.889
St. Louis City, MO	St. Louis	-0.583	2.889
Dallas, TX	Dallas	-0.633	12.889
Johnson, KS	Olathe	-0.650	2.889
Alameda, CA	Oakland	-0.667	5.889
Los Angeles, CA	Los Angeles	-0.683	14.889
Cook, IL	Chicago	-0.717	10.111
DuPage, IL	Wheaton	-0.800	5.222
Santa Clara, CA	San Jose	-1.167	7.444

Analysis for this question centers on the concept of a *consistency index* (Rice and Lyons, 2007). The consistency index is another application of the relative entropy statistic, employed earlier in the investigation of the first research question. However, instead of focusing on concentration or dispersion in terms of *geographic location*, consistency index focuses on concentration or spread in terms of *time*. Consistency index as applied here is a measure of how much variation over time exists in the number of next wave firms hosted by each county. With this consistency calculation, a city that consistently hosts the same number of firms each year would have a

consistency index of 100, while a city that hosts firms in one study year and no firms in any other year (in other words, the opposite of consistent performance) would have a consistency index of 0.

Table 6 lists the top 10 counties as ranked by consistency index nationwide. The listing features several locations, such as Middlesex County, Massachusetts (home of Harvard University, the Massachusetts Institute of Technology, and the “Route 128” cluster of high-technology firms), Fairfax County, Virginia (home of a vast array of defense contractors and George Mason University), and Dallas County, Texas<sup>3</sup> (home of the “Telecom Corridor”) that have been widely recognized as focal points of innovative activity in the economy and society (Lyons, 2000; Florida, 2002). Figure 1 expands this initial “top 10” list to map the geographic distribution of the top 20 US counties by consistency index. The figure indicates that urbanization is important to next wave consistency, as all 20 counties are part of a metropolitan area. The top three metropolitan areas in the country (New York, Chicago, and Los Angeles) each have at least one county in this ranking, again pointing to the role of city size in consistent firm generation. However, at the same time, the figure indicates that factors other than city size are at work. While growing counties including cities such as Los Angeles, San Diego, Houston, and Austin are highlighted in the map, dynamic Sunbelt and western counties in metropolitan regions such as Miami, Denver, Phoenix, Las Vegas, and Seattle are not included. This is also the case for many of the mid-tier metropolitan regions of the industrial core, including Pittsburgh, Cleveland, Cincinnati, Indianapolis, St. Louis, and Milwaukee. Clearly, next wave consistency is a phenomenon that transcends a simple application of city size or regional location (Sunbelt versus manufacturing belt) as primary explanatory factors.

**Table 6:** Leading counties by consistency index for the US next wave, 1996-2004.

County (County Seat)	Number of Next Wave Firms Hosted, by Year									Consistency Index
	1996	1997	1998	1999	2000	2001	2002	2003	2004	
Middlesex, MA (Cambridge)	13	21	14	12	13	12	12	13	15	99.23
Fairfax, VA (Fairfax)	14	13	14	14	16	7	11	14	14	99.09
Dallas, TX (Dallas)	14	18	12	14	8	16	16	10	8	98.34
Fulton, GA (Atlanta)	10	8	16	16	12	14	7	13	9	98.29
Los Angeles, CA (Los Angeles)	16	20	19	17	10	12	13	8	19	98.21
Orange, CA (Santa Ana)	13	8	15	13	8	5	11	11	13	98.07
Orange, FL (Orlando)	2	4	2	2	4	4	3	4	4	98.04
Hennepin, MN (Minneapolis)	7	5	8	6	6	9	3	4	7	97.94
Travis, TX (Austin)	6	8	5	9	6	4	4	4	8	97.91
Cook, IL (Chicago)	12	10	16	11	13	6	6	8	9	97.85

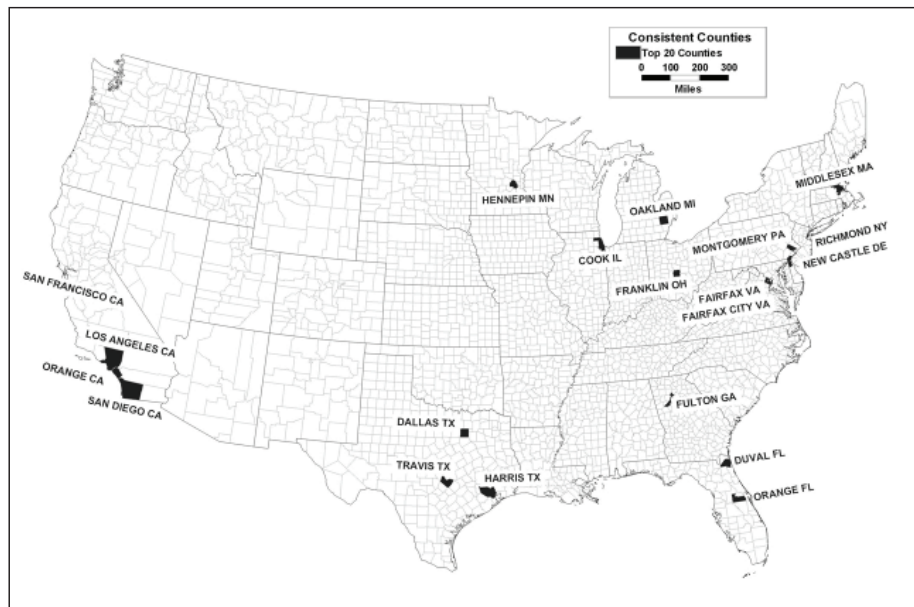


Figure 1: Top 20 Consistent, next wave counties, 1996-2004.

## CONCLUSION

This study has examined the evolution of the next wave group of fast-growing companies in the US over the period 1996-2004. Using three study questions, focusing on dispersion, regional development, and consistency, this research has provided a profile of the recent evolution of the spatial distribution of next wave activity across the US. The dispersion results have shown that, although the geographic distribution of next wave firms is gradually becoming more like that of establishment firms, next wave businesses remain more widely spread, especially at the county level of analysis. From this perspective, next wave businesses might be conceived as being agents in the spread of opportunity to alternate locations away from the primary poles of establishment businesses, such as midtown Manhattan and downtown Chicago. The regional development results, focusing on a trend analysis of next wave firm location by county nationwide, further substantiate this “opportunity spread” finding by showing that many of the leading counties in terms of next wave growth are only minor business centers by any other measure. The consistency analysis concludes the study findings by showing the highly selective nature of the distribution of counties that most reliably produce and host next wave firms throughout the study period.

As this study provides a current profile of the geography and evolution of next wave firms, it would be most appropriate to view the findings summarized above as a starting point for future research. Indeed, the research results obtained here lead to

two key directions for further investigation. First, the “opportunity spread” findings highlight a spatial distribution of considerable complexity, with a series of mid-tier metropolitan counties such as Palm Beach County, FL (West Palm Beach), Marion County, IN (Indianapolis), Utah County, UT (Provo), and Multnomah County, OR (Portland) being highlighted as focal points of next wave growth, along with selected counties in larger metropolitan regions such as San Francisco and Seattle (Table 5). Table 5 also shows a number of counties, many of which are in major metropolitan regions from the Midwest and Sunbelt, that experienced the greatest declines in next wave firm hosting of all counties nationwide.

The identification of complex geographic patterns of next wave growth and decline raises further possibilities for applied geographic research into these local economies. What has contributed to the success of the consistent next wave generators highlighted in the preceding analysis? At least part of the pattern could be accounted for by looking at the availability of start-up capital. Metropolitan Boston, Washington DC, Dallas, and Atlanta are all leaders in both next wave consistency and venture capital activity. However, other locations are not so well accounted for by such explanations. The study results show that places like Indianapolis and Provo, that are not large or established financial centers, are hosting increasing numbers of next wave firms. The rise of such non-traditional places might be linked to the “windows of locational opportunity” concept (Scott, 1988; Storper and Walker, 1989; Boschma and van der Knaap, 1999) and its emphasis on new industry formation as a fundamentally dynamic process. This literature shows that such dynamic “windows” are not necessarily spatially coincident with the local structures that led to previous business success. On the other end of the growth spectrum, why are counties in metropolitan regions such as Chicago and Los Angeles hosting fewer next wave firms through the study period? Markusen’s “profit cycle” model (1985), linking the evolution of industry to regional change, might be another source of insight into such local shifts in fortunes. From this perspective, the San Francisco Bay Area is a region of particular interest regarding the spatial complexity of growth and decline, as the region includes both a leading growth county (San Francisco) and two leading counties in next wave decline (Alameda and Santa Clara). Further research is needed to explore the factors that drive the complex locational patterns of next wave activity.

Second, as important as study into the geographic complexity of the next wave is an improved understanding of the extended impact of next wave firms on their local economies. What is the long-term influence of next wave firms on the local regions in which they grow? The development paths taken by such firms as they emerge from their ‘high-growth’ period, and the locational implications of such paths, have not been adequately addressed by geographic research. How do such firms continue in their development, and what impact do former next wave firms have on their host economies as they evolve away from their high-growth period?

In an ideal sense, it is straightforward to conceptualize the possibilities for further

development of high-growth next wave firms. In the best case for local economic development, a next wave firm would emerge as a high-growth firm, gain prominence and market share, and mature into a large, industry leader that provides a foundation for consistent and long-term prosperity in its original host region. However, other possibilities for continued next wave development also exist. A next wave firm might emerge, gain prominence, and then relocate to a different region, perhaps to gain access to key markets, resources or infrastructure needed for the firm's continued development. In such a case, the original host region may gain little benefit of a long-term nature.

Similarly, another factor that could impair positive regional impacts for the original host region would be acquisition of the next wave firm by a larger firm. In the computer software field, for example, dominant firms like *Microsoft* use their resources and market position to buy an emerging firm with a high-potential concept, rather than investing the resources to pursue such development internally.<sup>4</sup> Such an acquisition shifts the location of decision-making for the acquired firm, and may result in the physical relocation of other aspects of the firm's operations to suit the locational strategies of the acquiring firm.

So, in the context of the regional growth trends observed in counties in Florida, Indiana, and Utah, of what value is next wave development to the host economies of next wave firms? Does next wave activity hold a long-term benefit to the regions that generate and host such firms as they go through their high-growth periods? From a geographic perspective, do certain counties and regions do a better job than others in holding onto the jobs and benefits that are associated with the growth of next wave firms? Moreover, are there certain *types* of regions that are best-positioned to receive long-term benefits from their next wave businesses? It is in this area of overlap between business studies and geography that much fruitful work remains to be done.

## NOTES

1. One important consideration in comparing the establishment and next wave relates to the evolutionary characteristics of the two groups of companies. Establishment firms, while subject to merger, acquisition, and bankruptcy as with any firm, have the potential to remain large firms for many years. Thus, a county or city consistently hosting a stable set of establishment firms through the 1996-2004 study period is not an unlikely possibility. Such a status might simply be an indicator of a business community that is performing well enough to hold on to what it already has. By contrast, next wave firms, through their very nature as the most rapidly-growing of all firms, must see some alteration of their next wave status within a relatively short timeframe. Maintaining a high revenue expansion rate (typically 100% or greater per year for 'next wave list'

membership) for more than 5 years is very difficult, and continuation in such a status indefinitely is a mathematical impossibility. So, for a county to host a stable or growing total number of rapidly-changing next wave firms throughout the 1996-2004 period necessarily entails not just a maintenance of status involving the same firms, but an ongoing production and regeneration of new firms and business ideas. Thus, the tracking of next wave firm numbers by year for each county provides a measure of the level of innovation characteristic of the local community. Increasing next wave firm numbers in a county, then, are a good indicator of a dynamic local economy generating new business activity.

2. The relative entropy statistic calculation employs the following two equations:

$$H = \sum_{i=1}^n p_i \ln \left( \frac{1}{p_i} \right)$$

$$\hat{H} = \left( \frac{H}{\ln n} \right) 100$$

Equation 1 determines  $H$ , the absolute entropy of the system under study. In this equation,  $p_i$  is the proportion of all members of the system under study that fall within class  $i$ , and  $n$  is the total number of classes in the system. Equation 1 does not account for system size, so comparisons between systems (as carried out in the present analysis) using the  $H$  statistic alone are not meaningful. Equation 2 makes inter-system comparisons possible by calculating the unadjusted  $H$  value of the system as a fraction of the system's maximum possible entropy value,  $\ln n$  (Wheeler, 1990; Sui and Wheeler, 1993; Rice, 2004). As logarithms are undefined for values of 0, the relative entropy calculation employed here focuses solely on counties nationwide that have 1 or more businesses in the database, leaving out of the calculation all counties with no next wave business activity.

3. Attentive readers will note that the analysis has identified Dallas County, Texas, as both a national leader in *next wave decline* and one of the top counties nationwide in terms of *next wave consistency*. While such a pair of findings might appear to be problematic for an individual county, in fact it is quite possible for a county to possess both status indicators concurrently. While Dallas County experienced a large negative trend in comparison with other counties nationwide (-0.633, the seventh largest negative trend in the nation), the large size of Dallas County's next wave community (size index of 12.88, fourth largest in the nation) means that the decline in firms reflected by the negative trend is small relative to the number of firms still located and growing in the county, leading to the high consistency index (98.34, third ranked in the nation).
4. A good example of this is *Microsoft's* competition with *Google* in the area of data management and data-driven marketing. In 2007, *Microsoft* announced the largest purchase in its history by making a \$6-billion offer to acquire the online marketing firm *aQuantive*, while *Google* bought the online advertising

technology firm *DoubleClick* for \$3.1-billion (Avery, 2007). Online marketing is a particularly intense area of competition between the world's two dominant software companies.

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