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HUD-0004048

ECONOMIC ANALYSIS OF EFFECTS OF
BUSINESS CYCLES ON THE ECONOMY OF CITIES

THE RESPONSE OF CITY ECONOMIES TO
THE BUSINESS CYCLE

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Cooperative Agreement Number HA-5455
Cooperative Agreement Amount \$134,976

Submitted To:

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

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Original Submission: November 1984

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A severe recession in 1973 to 1975 followed by a weak expansion from 1975 to 1979 and another recession in 1979 through 1983 left many metropolitan areas with shortfalls in tax revenues and rising social costs. The effects of the weak national economy during this period were felt particularly severely in the central cities, which were already experiencing the stresses of secular declines in employment and the number of middle income residents. If the cyclical instability of the last decade is a forerunner of the remainder of the 1980s, it is clear that an understanding of central city and suburban economies requires a better understanding of the interaction between the business cycle and long run metropolitan growth. The purpose of this paper is to begin to fill this gap in our knowledge. In particular, this paper addresses the relationship between a metropolitan economy's long-run growth and its response to the national business cycle.

The results of our analysis indicate two interesting findings. One is that the business cycle influences a city's secular growth and a city's secular growth influences its response to the national cycle. More specifically we found that, suburbs experience recessions more acutely than central cities with recessions having a more detrimental effect on long run suburban than central city growth. A second major finding of the study is that, contrary to expectations, cyclical fluctuations in metropolitan employment are not explained by expansions and contractions in employment in continuing establishments but by fluctuations in births and closings. Employment in continuing establishments, which was expected to contract during recessions and expand during the recovery, was found to be stable over the cycle or to behave countercyclically. Instead, it is fluctuations in establishment births and closings that explain employment

growth and decline over the business cycle. During expansions in the national economy, local growth is explained by a high establishment birth rate and a low establishment failure rate. During downswings in the national economy a rising failure rate and falling birth rate explain employment declines.

This study is divided into four sections. The first section presents the model and provides a brief review of studies that have used the total Dun and Bradstreet file to analyze employment changes. The second section describes the data and methodology. The third section presents findings. The fourth section draws conclusions.

Model and Previous Literature

The interrelationship between a local economy's secular growth and cyclical changes is expected to be twofold. An area's rate of growth is expected to affect its response to the national cycle and a business cycle is expected to influence an area's long run rate of growth. Hypotheses concerning the local economy response to the national cycle will be addressed first.

During periods of slack demand in the national economy, urban economies should respond with a drop in new establishment formations, employment contractions in continuing establishments, and an increase in the rate of business failures. Conversely, when the national economy is experiencing strong growth, the urban economy is expected to respond with reductions in business failures and increases in investment in the form of new business formations and on-site expansions.

While this pattern is expected to apply to both central city and suburban economies, the variability of births, deaths, and closings is

expected to vary across central city and suburban economies. Closing rates and employment in continuing establishments are expected to be more cyclically sensitive in the area where the industry is growing most slowly. Birth rates are expected to be more variable where the industry is growing most rapidly and intra-urban migration is expected to slow during downswings in the national economy. Whether the changes net out to greater cyclical instability in central city or suburban economies is uncertain. Several theories and previous empirical work undergird these hypotheses.

One hypothesis that bears on these expected patterns is that plants producing with an old capital stock do not compete well in a slack national economy (Bolton, 1978; Howland, 1984). According to this theory, plants producing with an old, inefficient capital stock experience disproportionate cutbacks in output and employment and also fail at higher rates during downswings in the national economy. Since old capital is concentrated in declining and slow growth central cities, these areas should experience relatively severe recessions.

This argument applies to branch plants and assumes that plants producing with old capital have relatively high average costs. Plants with a high average aged capital stock are expected to experience high average costs for three reasons. First, old capital is less appropriate than new capital for current relative prices of land, labor, and other factors of production. Therefore, the old-capital plant is relatively costly to operate. Secondly, technological changes render old plants less cost effective than new facilities. For example, multistory plants are less efficient due to the introduction of the assembly line. Finally, old plants are unlikely to be located in cost-minimizing locations. Sources

of raw materials and transportation modes shift with time rendering old sites less efficient. Moreover, due to technological changes in capital equipment, input mixes change and old locations are unlikely to minimize the transport costs of the new input mix. For any or all of these reasons, costs are expected to be relatively high in plants producing with old capital. For these reasons branch establishments with a high average age of capital should have a higher average cost curve and lower profits than plants producing the same product with a new capital stock.

During downturns in the national economy and slack demand for the firms' output, losses in profits are minimized when cutbacks are concentrated in the least efficient, highest average cost plants. During the expansionary phase of the cycle, output should again resume in the relatively old plants. For this reason employment is expected to be relatively variable in firms with old capital; and in the aggregate, employment cycles should be more variable in central cities where old capital is concentrated.

Areas with old capital are also expected to be particularly vulnerable to plant closings. Single and multiplant firms are more likely to shut down during the recession, when their capital is old. Economic theory suggests that a firm will continue to produce as long as price is greater than average variable costs (AVC). When price falls below AVC the firm or plant will be closed. With high AVCs in plants producing with old capital, this shut-down should take place earlier in the old capital, high-average-cost plants than in new, efficient operations. Thus we would expect plant closings to be greater in areas where old capital is concentrated.

Varaiya and Wiseman (1977) have suggested another reason that an old capital stock may lead to more severe local recessions. The retirement of obsolete capital is concentrated in areas where the average age of capital is high. During the expansionary phase of the cycle, scheduled retirements may be postponed because either the revenues from running the old capital are temporarily higher than the salvage value of the land, labor and capital, or orders from regular or new customers must be met. With the end of the expansion, the delayed retirements combined with the regularly scheduled retirements are bunched together, creating the appearance of a more volatile cycle. This phenomenon is expected to explain a concentration of plant closings during economic downturns in areas with a high average aged capital stock.

Old capital in this argument is a sign of long run disinvestment. Due to high relative wages, transport costs, taxes, insurance costs and declining markets, firms may disinvest in a central city with a view to eventually closing a plant. It is these permanent plant closings that are described by Varaiya and Wiseman. Since branch plants with old capital are spatially concentrated in central cities rather than suburbs, it is expected that the volatility of central city establishment closing rates will contribute to the variability of employment in central cities.

In contrast to the above argument, establishment closing rates may be more variable in fast growth economies than slow growth economies. A high establishment birth rate in suburbs implies that suburban economies are comprised of a relatively high proportion of new firms. New firms are highly susceptible to failure in their early years and are expected to be particularly sensitive to closure during downswings in the national economy.

Lack of access to capital, and uncertain markets and suppliers are often cited reasons for the higher failure rate of new firms. Closing rates, therefore, may be more variable in suburbs than central cities due to a high proportion of suburban employment in new firms (Armington and Odle 1982, Daniels 1979). Closing rate, therefore, may be more variable in suburbs than central cities due to a high proportion of suburban employment in new firms.

Another hypothesis that bears on the relative cyclical sensitivity in central cities and suburbs is that headquarters of firms will be less vulnerable to economic cycles than branch plant locations. In one interpretation, cities can be divided into "command and control" centers and "production" centers (Noyelle and Stanback, 1983). The former have a high concentration of service and management activities, with more highly-trained workers, which insulates them from cyclical fluctuations.

Birth rates are expected to be most variable where the industry is growing most rapidly. During expansions in the national economy birth rates are high and occur disproportionately in the locale where production costs are minimized and markets are growing most rapidly. For most industries birth rates are higher in suburbs than central cities. When national economic growth begins to slow, the birth rate falls, leading to greater swings in birth rates in fast growth economies, i.e. suburbs.

For two reasons, cyclical fluctuations are expected to have spatially uneven impacts on long run rates of growth. First, areas that experience high establishment birth rates have been hypothesized above to experience high rates of establishment failures during downturns in the local economy. Thus many businesses that are viable in the long run fail in their early years, when an economic downturn hits a fast growth area.

Thus recessions should dampen long run rates of growth to a greater extent in fast growth than slow growth areas.

Secondly, it is hypothesized that a recession depresses the central city to suburban migration of establishments. It is hypothesized that firms delay plans to move during periods of economic decline and uncertainty. A large number of intra-urban plant moves occur to permit the firm to acquire more land for an expansion. Since expansions are likely to be delayed during periods of excess capacity at current plants, relocations are likely to be delayed. In this case, a cyclical downturn in the national economy would depress long run suburban growth and slow long run central city decline.

Two major studies have used the data from all industries in the D&B file to analyze long run employment changes in subnational economies. Struyk and James (1975) studied employment changes in all manufacturing industries within four Standard Metropolitan Statistical Areas (SMSAs). The study covered the growth period from 1965 to 1968 and concluded that manufacturing was decentralizing. They found that the most important component of metropolitan employment growth was in establishments that remained stationary throughout the observation period and that natural increase, births minus closings, played a secondary role. The spatial pattern of births greatly favored areas outside the central city and closings were, in general, as high in suburbs as in central cities. Our data on all SMSAs and three industries in the growth period 1973 to 1979 are consistent with the finding of the Struyk and James study.

Birch (1979) used the Dun and Bradstreet data to analyze the components of regional employment change. Birch studied the periods 1972 to 1974 and 1974 to 1976. Both of his time periods include one year of

economic expansion and one year of an economic contraction. Birch's analysis shows that the sequential closing and migration of establishments plays a small role in regional differences in growth rates and, in particular, the growth of the sunbelt. He found high establishment birth rates and on-site expansions to be the most important components of change and the primary factor in the shift of employment from the frostbelt to sunbelt. Finally he noted that plant closing rates are spatially even. Birch's findings for the regions are consistent with our findings for metropolitan areas.

Methodology

All establishments in three 3-digit SIC Code manufacturing industries including machinery manufacturing (SIC 354), electronic components (SIC 367) and motor vehicles (SIC 371) were drawn from the Dun and Bradstreet (D&B) Duns Market Indicators (DMI) file. The data set includes 27,014 machine tool establishments, 14,067 electronic components establishments and 11,909 motor vehicle establishments. Because the sum of employment in each industry is equal to nearly 100 percent of total employment as reported by the Census of Manufacturers, the data is treated as a census rather than a sample.

DMI files from four years were merged to permit an analysis of establishment behavior over the business cycle. The years include the peak year of 1973, the trough year of 1975, the peak year of 1979 and the trough year of 1983. The merger of the four DMI files permits an analysis of employment changes for two recessions, 1973 to 1975 and 1979 to 1982 and one expansion, 1975 to 1979.

For each establishment a history was created over the period. If an establishment existed in the file in an earlier year but not in a later year the establishment was registered as a closing. If the establishment was absent from the file in an earlier year and appeared in a later year and had a date of birth that corresponded to an interim year the establishment was registered as a birth. If the establishment relocated, it was tagged as a mover. This merged data set was then merged again with the U.S. Bureau of the Census' City Reference File. This merger identified each metropolitan establishment as having either a central city or suburban location.¹

The three industries studied here represent an average growth industry, machine tools, which grew at a national annual average rate of 2.2 percent from 1973 to 1979; a fast growth industry, electronic components, which grew at a national annual average rate of 4.7 percent over the same period; and a stagnating industry, motor vehicles, which grew at a national annual average rate of .9 percent over the period. The long run growth pattern of machine tools is similar to that of all manufacturing employment, which grew at an annual average rate of 2.5 percent over the period 1970 to 1979. Total employment in the three industries represented 3 percent of all manufacturing employment in 1979 (Employment and Earnings, 1983).

Results

The annual average rates of long run employment growth in the machine tool, electronic components, and motor vehicle industries in central are

1. For complete discussion of the creation of the data set, see Howland's "Using the Dun and Bradstreet Data to Analyze the Effects of Business Cycles on Firm Employment."

shown in Table 1. The growth rates are calculated for the period 1973 to 1979 for both central cities and suburbs. Both 1973 and 1979 were peak employment years for the nation. These central city and suburban annual average growth rates are further disaggregated into components of employment change, including births, closings, expansions and net migration.

During the 1973-79 period, machine tool employment declined by an annual average rate of 2.4 percent in central cities and grew at 4 percent in suburbs. Electronic components employment grew more rapidly in central cities than suburbs, growing at 2.2 percent per annum in central cities and .5 percent per annum in suburbs. Motor vehicle employment declined in both central cities and suburbs, with a greater decline in central cities, at 6.3 percent, than suburbs at 3.7 percent.

Unfortunately, data are not yet available on the relative growth rates of central city and suburban manufacturing for all non-agricultural employment for the 1970 to 1980 period. However, data for the 100 cities for which 1960 and 1970 census employment data are available show that central city employment grew 2 percent over the decade. For the 90 Standard Metropolitan Statistical Areas for which 1970 employment could be calculated within 1960 boundaries, the growth rate was 13.7 percent, indicating that suburban employment exceeded that of central cities (Bradbury et al., 1982, p. 32). This suggests that the pattern identified for machine tools and motor vehicles is typical for most employment. The tendency for electronic components to centralize suggests that some innovative manufacturing industries still find central cities the most profitable location for new investment. It should be noted that manufacturing employment is not growing in all suburbs and declining in all central cities. There are clear regional variations in these patterns.

Table 1

Peak to Peak Annual Average Employment
Growth Rates in Central Cities and Suburbs,
Subdivided into Components of Change

1973-79

	Central City	Suburbs
-----Machine Tools-----		
Births	4.3	7.1
Closings	7.0	5.4
Net Expansion	0.5	1.9
Migration	<u>-0.2</u>	<u>0.4</u>
Total	-2.4	4.0
-----Electronic Components-----		
Births	6.9	5.9
Closings	7.3	8.1
Net Expansion	3.5	2.3
Migration	<u>-0.9</u>	<u>0.4</u>
Total	2.2	0.5
-----Motor Vehicles-----		
Births	0.3	0.5
Closings	5.7	5.2
Net Expansion	-0.9	0.7
Migration	<u>-0.2</u>	<u>0.3</u>
Total	-6.5	-3.7

Source: Urban Institute analysis of the Dun and Bradstreet data.

The data in Table 1 also indicates that, in areas where each industry is growing most strongly, the growth is explained by relatively high employment growth due to high birth rates and strong expansion rates. For example, machine tool employment grew more rapidly in suburbs than central cities because suburban areas are experiencing higher rates of new establishment formations and stronger expansions in continuing firms. Machine tool birth rates are 4.3 percent in central cities as compared with 7.1 percent in suburbs. Continuing central city establishments expanded at an annual average rate of .5 percent, whereas suburban establishments expanded at a rate of 1.9 percent. Similarly, employment in electronic components establishments grew more rapidly in central cities than suburbs, because central city birth and expansion rates for this industry are higher than suburban rates. Central city birth rates were 6.9 percent per annum for electronic components while suburban rates were only 5.9 percent per annum. Continuing central city establishments expanded at 3.5 percent while suburban establishments expanded at a rate of 2.3 percent. The pattern is similar for motor vehicles.

New investment, in the form of on-site expansions and new business formations, favors suburban locations for many well documented reasons. The availability and flexibility of trucking as a means of transporting raw materials and finished products, technological changes that favor land intensive production processes in combination with relatively cheap suburban land prices, improvements in communication, and the decentralization of the labor force are all factors that have made suburban areas a more desirable location for most manufacturing.

As for closing rates, for all three industries rates of employment loss due to the closing of establishments are greater where the industry

is growing most slowly. However, the difference in motor vehicles' closing rates are not major, at 5.7 percent in central cities and 5.2 percent in suburbs.

The central city to suburb migration of establishments plays a minor but positive role in suburban growth for all three industries. For example, the net central city to suburb migration of machine tool firms decreased central city employment by about .2 percent per year, whereas the net immigration of firms to suburbs increased suburban employment by .4 per year.

A clear pattern of long run growth emerges from these data. Growth in metropolitan economies is explained primarily by high birth rates of new establishments and employment growth in continuing firms. There appears to be some tendency for slower growth to be explained by relatively high closing rates; however, central city/suburban differences in these rates are not large. For all three industries, even the centralizing electronic components industry, net migration contributes to suburban growth. This pattern of long-run growth has a number of implications for the cyclical behavior of central cities and suburbs. These implications will be touched on later.

Table 2 shows annual average central city and suburban growth rates over the business cycle. Again the growth rates are disaggregated into employment changes due to births of new establishments, closings of existing establishments, net expansions in continuing establishments and net migration.

The aggregate growth rates over the cycle show the expected pattern of falling employment growth during recessions and rising employment growth during national economic expansions. For example, central city

machine tool employment declined by 5.53 percent per annum during the 1973-75 recession and at -.64 percent per annum during the 1975-79 expansion, declining again to an annual average growth rate of negative 4.19 percent during the 1979-82 recession. The pattern is similar for central city and suburbs for all industries.

Birth rates in both central cities and suburbs also show the expected pattern. Birth rates rise during the expansions in the national economy and fall during recessions. For example, central city machine tool employment grew at 2.4 percent per annum due to new births from 1973 to 1975, increasing to 4.6 percent during the 1975-79 expansion, and decreasing again to 3.8 percent per annum during the 1979-82 recession.

Closings also show the expected pattern by rising during recessions and falling during the expansion. For example, for central city machine tools, employment loss due to closings of establishments was 8.0 percent during the 1973-74 recession, decreased to 5.6 percent per annum during expansion, and rose again to 9.1 percent per annum during the most recent recession.

Contrary to expectations, employment in continuing establishments often stabilizes rather than reinforces employment swings. For example, during the 1975-79 expansion, employment in continuing machine tool establishments grew at the slow annual average rate of .53 percent per annum. During the 1979-82 recession, employment growth in continuing firms picked up and grew at the even higher annual average growth rate of 1.54 percent. This countercyclical employment pattern occurs in several other industries and periods and is particularly dramatic in the case of central city motor vehicles employment. This finding suggests that during

Table 2
Annual Average Rates of Employment
Change Over the Business Cycle, by Component of Change
(percent)

	1973-75	1975-79	1979-82
		Machine Tools	
		Central City	
Births	2.36	4.59	3.83
Closings	7.96	5.60	9.14
Net Expansion	0.39	0.53	1.54
Net Migration	<u>-0.32</u>	<u>-0.16</u>	<u>-0.42</u>
Total	-5.53	-0.64	-4.19
		Suburbs	
Births	4.92	7.82	5.34
Closings	8.27	4.18	7.05
Net Expansion	3.17	1.38	1.19
Net Migration	<u>0.43</u>	<u>0.36</u>	<u>0.54</u>
Total	0.25	5.38	0.02
		Electronic Components	
		Central City	
Births	2.95	8.43	4.91
Closings	9.74	6.16	7.09
Net Expansion	3.26	3.52	1.65
Net Migration	<u>-0.42</u>	<u>-0.04</u>	<u>0.09</u>
Total	-3.95	5.75	-0.44
		Suburbs	
Births	3.71	6.57	6.85
Closings	10.85	6.45	6.65
Net Expansion	3.29	1.71	2.34
Net Migration	<u>0.52</u>	<u>0.34</u>	<u>0.01</u>
Total	-3.33	2.17	2.55
		Motor Vehicles	
		Central City	
Births	0.11	0.32	0.28
Closings	3.67	5.41	5.50
Net Expansion	3.62	-2.94	-4.62
Net Migration	<u>-0.23</u>	<u>-0.13</u>	<u>-0.06</u>
Total	-0.17	-8.16	-9.90
		Suburbs	
Births	0.28	0.66	0.76
Closings	4.60	5.48	8.94
Net Expansion	-7.15	4.72	-0.37
Net Migration	<u>0.46</u>	<u>0.25</u>	<u>0.23</u>
Total	-11.01	0.15	-8.32

Source: Urban Institute analysis of the Dun and Bradstreet data.

recessions continuing establishments pick up production and employment from those establishments that close and that cyclical variability in metropolitan areas is explained by fluctuations in birth and closing rates, not by the procyclical behavior of on-going establishments.

Finally, migration patterns do not appear to be sensitive to swings in the business cycle. Migration is as likely to increase during downswings and decrease during the upswing of the cycle as to decrease during the recession and increase during the expansion. This latter finding suggests that migration patterns do not dampen long run central city decline during downswings in the national economy, as hypothesized above.

To summarize, the result shows that cyclical swings in metropolitan employment are explained primarily by fluctuations in the birth rate of new establishments and closing rates of existing establishments. Employment in continuing establishments does not coincide with the cycle as expected and, in fact, frequently behaves countercyclically. Finally, fluctuations in migration rates do not appear to influence the variability of central city or suburban economies.

In order to compare the cyclical sensitivity of central city employment with that of suburban employment, differences between the annual average growth rate during expansion and the annual average growth rates during the recession were calculated. The absence of monthly or quarterly employment time series prohibits a more sensitive measure of cyclical volatility. The measure of cyclical fluctuation used here measures the change in average growth rates between the expansion and the recession. Thus, the larger the "swing" measure the greater the economy's variability over the business cycle. For example, taking the annual average growth

rates shown in Table 2, the swing in employment for central city machine tools over the 1973-79 cycle is $(-.64 - (-)5.53) = 4.89$. A positive measure indicates procyclical behavior, whereas a negative value indicates countercyclical behavior. These measures for central cities and suburbs are reported in Table 3 for machine tools, electronic components, and motor vehicles.

Table 3 demonstrates that machine tool and motor vehicle employment are more cyclically variable in suburbs than central cities and that electronic components employment is more variable in central cities than in suburbs. This pattern suggests that an industry is most cyclically variable where it is growing most rapidly.

Recent work by Manson (1983) compared central city and suburban county income cycles for two periods: 1969 to 1973 and 1973 to 1980. He found a higher degree of cyclical sensitivity in the economies of suburban areas than central cities. Manson indicates that the variability of suburban economies was due to suburban dependence on manufacturing and construction, two cyclically sensitive sectors. The findings presented here indicate another reason for the variability of suburban economies, that is, most industries are growing more rapidly in suburbs than central cities.

To determine whether it is variability of births or closing rates that explain the variability of the area where the industry is growing most rapidly, swing measures were calculated for central city and suburban births and closing rates. These measures are shown in Table 4. A positive swing measure for birth rates indicates birth rates rise during economic expansions and fall during recessions. A negative swing measure indicates countercyclical behavior. For closing rates a negative swing

Table 3

Differences in Annual Average Growth Rates
Between the Recession and Expansion*
For the 1973-79 and 1975-82 Cycles
Central Cities and Suburbs

	Central City	Suburbs
Machine Tools		
1973-79	4.89	5.13
1975-82	3.55	5.36
Electronic Components		
1973-79	9.70	5.50
1975-82	6.19	-0.38
Motor Vehicles		
1973-79	-8.0	11.6
1975-82	1.84	8.47

* Annual average growth rate during expansion - annual average growth rate during recession.

Source: Table 2.

measure indicates closing rates fall during expansions and rise during recessions. A positive measure for closings indicates countercyclical behavior. For example, for machine tool establishment births behaved procyclically in central cities for the 1973-79 cycle, the swing measure is $(4.59 - 2.36) = 2.2$. Closings also behaved procyclically; the cyclical swing measure is $(5.60 - 7.96) = -2.4$.

The results of Table 4 show that both births and closings are more variable where the industry is growing most rapidly. For machine tools and motor vehicles, both births and closings are more variable in suburbs, and for electronic components births and closings are more variable in central cities. For example, for central city machine tool establishments the swing measures are 2.2 and -0.8 for births and -2.4 and -3.5 for closings. In suburbs the comparable swing measures were 2.9 and 2.5 for births and -4.1 and -2.9 for closings. There are two exceptions to this pattern; Electronic component establishment closings during the 1973-79 cycle, where the swing in suburban closings exceeds that of central city, and motor vehicle establishment closings during the same period where the swing measure for central city closings exceeds that of the suburbs. The cyclical swing measures in the later 1975-82 cycle follow the predicted pattern for both industries.

These data present a consistent story. Industries are most cyclically variable where they are growing most rapidly and this greater variability is explained by larger fluctuations in births and closings in the more rapidly growing economy.

Table 4

Differences in Annual Average
Birth and Closing Rates Between
The Recession and Expansion*
For the 1973-79 and 1975-82 Cycles,
Central Cities and Suburbs

<u>Machine Tools</u>				
	<u>Central City</u>		<u>Suburbs</u>	
	Births	Closings	Births	Closings
1973-79	2.2	-2.4	2.9	-4.1
1975-82	-.8	-3.5	2.5	-2.9

<u>Electronic Components</u>				
	<u>Central City</u>		<u>Suburbs</u>	
	Births	Closings	Births	Closings
1973-79	5.5	-3.5	2.9	-4.4
1975-82	3.6	-.9	-.3	-.1

<u>Motor Vehicles</u>				
	<u>Central City</u>		<u>Suburbs</u>	
	Births	Closings	Births	Closings
1973-79	.2	1.7	.4	.9
1975-82	.0	-.1	-.1	-3.5

* Annual average birth (closing) rate during expansion - annual average birth (closing) rate during recession.

Source: Table 2.

During expansions in the national economy net investment rises, leading to particularly strong increases in birth rates in areas where an industry operates most profitably. This strong expansion turns into a relatively severe downturn as the fledgling firms created during the expansion close at high rates during the recession. Our analysis of the Dun and Bradstreet file supports the argument that establishment closings are concentrated in fledgling firms. In 1975, 24 percent of all machine tool firms were aged 0 to 4 years and yet firms aged 0 to 4 years comprised 29 percent of all closings between 1973 and 1975. Approximately 18 percent of all machine tool firms were 20 to 29 years old and yet this age group accounted for only 15 percent of all closings between 1973 and 1975. The pattern held for the other two industries studied as well. This finding is inconsistent with arguments that areas where old capital is concentrated will experience particularly severe recessions.

It was also hypothesized above that central city employment was stabilized by the concentration of headquarters in central cities. Our analysis of the spatial pattern of employment in headquarters in the three industries considered here shows that while a greater share of central city employment is in headquarters than is the case for suburbs, the differences are not major. Thirty-four percent of central city machine tool employment is in headquarters while only 24 percent of suburban machine tool employment is in headquarters. Thirty-eight percent of central city electronic components employment is in headquarters, with 35 percent of suburban electronic components employment in headquarters and 16 percent of central city motor vehicles employment in headquarters, whereas the comparable figure for suburbs is 10 percent. Except for machine tools, these differences in employment shares in headquarters do

not appear large enough to contribute greatly to the cyclical stability of central city economies.

Summary

The evidence presented above indicates that an area's rate of long run growth influences its cyclical exposure and that an area's cyclical sensitivity also has an effect on the rate of an industry's long run growth. An analysis of employment changes in 53,000 establishments indicates that industries are most cyclically variable in areas where they are growing most rapidly. Both machine tool and motor vehicle employment were more cyclically sensitive in suburbs, while electronic components employment was more variable in central cities.

Employment fluctuations over the business cycle in both central cities and suburbs are explained by fluctuations in establishment birth and closing rates. Employment in continuing establishments did not contract during recessions and expand during the recovery, as expected, but was stable or behaved countercyclical over the cycle. A major implication of this result is that employment is more variable in fast growth economies. Strong long-run growth occurs because of a metropolitan area's high establishment birth rate. This high establishment birth rate makes the economy vulnerable to national recessions, because the establishments newly created during the expansion fail at high rates during the downturn. This result suggests that recessions depress long run rates of growth more acutely in fast growth economies than slow growth economies. Long run economic growth is slowed when fledgling firms that are potentially viable in the long run fail because they are hit with an economic downturn in their early years.

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These findings demonstrate that the old capital stock and slow growth
of central cities is not always a liability. The high proportion of
mature firms in slow growth industries, and in the aggregate in slow
growth economies, promotes cyclical stability. In addition, while
economic recessions are uneven in their spatial impacts, it is suburban
economies, not central city economies, that bear the disproportionate
share of employment losses.
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