The Impact of Small Businesses on Texas Counties:

A Cross-Section Study of Establishment Sizes by Sector and County-Level Income

Javier Oyakawa, Dominique Halaby and Branco Ponomariov[1]

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Abstract:

To understand the economic impact of small businesses, particularly those with less than 100 employees, in the state of Texas, this study analyzes the relationship between the relative importance of these firms in their respective industries and the level of households' median income across counties in the state. The study finds that in some industries (e.g. the professional, scientific and technical sector and the health care sector), the higher percentage of very small firms is positively related to higher incomes, while in other industries this relationship is reversed. The information for establishment by size for counties in Texas came from the County Business Patterns data set for the year 2007.

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Introduction:

The realm of economic development has often been described as comprising of three distinct strategies: attraction, growth and incubation (Lichtenstein & Lyons, 2006). The effective use of these strategies is dependent upon policy makers and practitioners abilities to effectively segment economic development clients to reflect the needs of their community. Small businesses, especially as they relate to incubation, are often regarded as significant contributors to job growth and economic development primarily for their role in entrepreneurial activities and innovation creation (Audretsch, 2002; Birch 1987; Malecki, 1994; McQuaid, 2002). Yet the relationship between small business activity and regional development is not fully understood and lacks a solid theoretical framework to effectively guide public policy (McQuaid, 2002).

While some studies have found a positive correlation between regional output growth and the share of small businesses in the region (Martinez, 2005), others have argued that the conventional idea that small businesses are among the main engines for job creation in the US economy is not robustly supported by mixed empirical findings on the subject (Craig, Jackson, & Thomson, 2008; Shaffer, 2006a). Some studies (Craig, Jackson, & Thomson, 2008; Shaffer, 2006a) have found a negative relationship between establishment size and employment growth. Others (Davis & Haltiwanger, 1992; Davis, Haltiwanger, & Schuh, 1996) have gone on to suggest that the employment gains in small businesses are not permanent or stable. Davis and colleagues find that although small businesses create jobs at a high rate, these jobs are also destroyed at a similar rate, while others (Baptista, Escaria & Madruga, 2008) have argued that the level of business formation and employment growth is more a function of types and quality of the small businesses.

Despite this disparity, small businesses have been found to have multiple other contributions to economic growth, as evidenced by studies focusing on other relevant economic development variables, such as income growth, where findings seem to be more robust. Income is a good indicator of economic growth since it captures two important dimensions of growth: demand for labor and general economic vitality of a region. Prior studies (Shaffer, 2006b) find a positive relationship between the concentration of small businesses in certain industries (e.g. manufacturing, retail, wholesale and services) and median income in a jurisdiction, while increase in average establishment size is negatively associated with median income (Shaffer, 2002, 2006b).

One source of the ambiguity of small businesses impact on economic growth may stem from the overlap and confusion accompanying the distinction between entrepreneurship and small business ownership (Carland, Hoy, Boulton, & Carland, 1984). While many entrepreneurial businesses are small, not all small businesses are entrepreneurial, hence the importance of incorporating sectoral control variables in studies assessing small businesses' contributions to local economies. Since small businesses are important sources of innovations (Acs & Audretsch, 1991), all else equal, it is likely that small businesses' contribution to regional economies will be contingent the levels of innovative opportunities found in different sectors, and related – the concentration of small businesses in such potentially innovative sectors is likely to have greater impact on income and employment growth than in others.

The mix of "innovative" sectors and the resulting opportunities for small and entrepreneurial businesses are not time-invariant, but is dependent on time periods and level and stage of technological change (Audretsch, 1995; Lefebvre & Lefebvre, 1993).

As more companies view globalization and outsourcing as strategies to remain competitive, the growth of one firm is often conditional on the growth of another. Often times large firms outsource to smaller ones to cut cost and/or to maintain a comparative advantage. As a consequence, the growth and ensuing impact of these small businesses is in direct relationship to the activities of the larger firm (Lichtenstein & Lyons, 2006).

Some of the sectors traditionally and currently characterized with ample opportunities for entrepreneurship, innovation, and growth are health-care and science- and technology- based industries (Acs & Audretsch, 1991).

Based on the prior research on the impact of small businesses on income, we approach the analysis that follows with the general expectation (hypothesis) that a greater concentration of small businesses at the county level will be associated with higher median income. Moreover, it is likely that this influence will be stronger and more robust for more innovative sectors with higher human capital requirements such as healthcare, and science- and technology- based professional services.

Methodology:

To understand the economic impact of small businesses, particularly those with less than 100 employees, in the state of Texas, this study analyzes the relationship between the relative importance of these firms in their respective industries and the level of households' median income across counties in the state. The study finds that in some industries the higher percentage of very small firms is positively related to higher incomes. On the contrary, in other industries this relationship is reversed: high percentage of small businesses are related to lower than average county income.

The study partially follows Shaffer's paper (2006)[2] on the relationship of counties' median household income growth and the size of firms in the U.S. Similar to Shaffer's paper, the present

[2] Shaffer, Sherrill (2006). Establishment Size by Sector and County-Level Economic Growth. Small Business Economics 26: 145-154.

study uses a cross-section sample of counties and analyzes how a set of variables, including the relative size of businesses by sector, affects counties' incomes. Also, similar to Shaffer's study, we used percentages of units of small businesses by sector rather than the employment numbers. Different from that mentioned paper; here the dependent variable is counties' median household *income level* instead of *income growth*. What's more, instead of four industrial sectors here six sectors are studied: professional, scientific, and technical services; health care and social assistance; manufacturing; transportation and warehousing; construction; and other services.

The information for establishment by size for counties in Texas came from the County Business Patterns data set for the year 2007. The dependent variable is the counties' median household income for 2007, as reported by the Census Bureau. The control variables were taken from different official data sources: the percentage of population with at least a bachelor's degree came from the 2000 Census data, the value of local government revenues per capita was taken from the 2002 Statistical Abstract, and the county populations came from the 2007 Bureau of Economic Analysis Regional Economic Information System (REIS) data.

The size of firms enter the regressions in the form of percentages of firms with less than 5 employees (model 1), less than 10 employees (model 2), less than 20 employees (model 3), less than 50 employees (model 4), and less than 100 employees (model 5), with respect to the total number of firms in the industries.

In order to keep the comparisons among the regressions consistent, only those counties where all the industrial sectors show at least one small business with less than 100 employees were included, reducing the number of Texan counties considered from 254 to between 187 and 191 depending on the industry. For this reason other sectors, like finance, mining or utilities, were not included at this time.

Results:

As previously mentioned, some of the results show a strong statistically positive relationship between counties median household income and the percentage of small business establishments, this is the case of the professional, scientific, and technical services sector. Table 1 shows the results for this sector.

Table 1. Professional, Scientific, and Technical Consultations Services Sector

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.0302 *	5.0493 *	5.0389 *	5.0634 *	5.0535 *
log_pop_25_edu_2000	0.3326 *	0.3451 *	0.3444 *	0.3439 *	0.3448 *
log_loc_gov_rev_per_cap	-0.0609 ***	-0.0652 ***	-0.0631 ***	-0.0668 ***	-0.0649 ***
log_pop_2007	0.0198 ***	0.0166	0.0166	0.013	0.0143
log_per_prof_less_5	0.1624 *	na	na	na	na
log_per_prof_less_10		0.06	na	na	na
log_per_prof_less_20			0.0753	na	na
log_per_prof_less_50				-0.7596	na
log_per_prof_less_100					-0.776
Total R-Square	0.4485	0.4338	0.4337	0.4373	0.4349
Degrees of freedom	185	185	186	186	186

* significant at 1%, ** significant at 5%, and *** significant at 10%

There is a strong statistical significance between the less than 5 employees percentage and the median household income (significant at 1 percent). The control variables also show significant results and with the expected signs. It was expected that the percentage of the population with at least a bachelor's degree and the size of the county population have positive coefficients. The negative sign for the local government revenues per capita's coefficient was also expected. On the other hand, larger sizes of the small businesses, at least for these samples, do not show statistically significant coefficients. This might be highlighting the importance of the relative distribution of small businesses *within each sector* as there are important differences in wages among industrial sub-sectors.

The results also show robustness as the different models yield coefficients that are relatively similar for all variables, included the intercept.

Table 2 shows the results for the health care sector. Here, similar to the professional sector, there are statistically significant positive coefficients for firms with less than 10 and less than 20 employees; nevertheless the relationship is not as strong as with the previous sector. The other control variables show the expected signs.

Table 2. Health Care and Social Assistance Sector

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.0408 *	5.0342 *	5.0397 *	5.0454 *	4.9974 *
log_pop_25_edu_2000	0.3339 *	0.328 *	0.3347 *	0.3409 *	0.3346 *
log_loc_gov_rev_per_cap	-0.068 ***	-0.0593	-0.0577	-0.0627 ***	-0.0502
log_pop_2007	0.02 ***	0.0195 ***	0.0146	0.0149	0.016
log_per_hea_less_5	0.0301	na	na	na	na
log_per_hea_less_10		0.22 **	na	na	na
log_per_hea_less_20			0.2263 ***	na	na
log_per_hea_less_50				0.0903	na
log_per_hea_less_100					0.4829
Total R-Square	0.442	0.4494	0.4424	0.4339	0.44
Degrees of freedom	184	186	186	186	186

* significant at 1%, ** significant at 5%, and *** significant at 10%

On the other hand, table 3 shows the results for the manufacturing sector and is different not only from the previous sectors but also different from Shaffer's paper, in that there are no significant relationships between the size of the firms and the counties' income.

Table 3. Manufacturing Sector

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.0631 *	5.0427 *	5.0446 *	5.0525 *	5.0602 *
log_pop_25_edu_2000	0.341 *	0.3462 *	0.346 *	0.347 *	0.3457 *
log_loc_gov_rev_per_cap	-0.0722 ***	-0.0645 ***	-0.0638 ***	-0.0653 ***	-0.0669 ***
log_pop_2007	0.0148	0.0147	0.0149	0.0142	0.0137
log_per_mfg_less_5	-0.029	na	na	na	na
log_per_mfg_less_10		-0.0392	na	na	na
log_per_mfg_less_20			-0.0345	na	na
log_per_mfg_less_50				-0.0939	na
log_per_mfg_less_100					-0.1488
Total R-Square	0.432	0.4359	0.4344	0.4363	0.4359
Degrees of freedom	182	186	186	186	186

* significant at 1%, ** significant at 5%, and *** significant at 10%

Table 4 shows the results for the construction sector. Different from the previous sectors there is a strong negative relationship between firms with less than 20 employees and the counties' median household income while the other coefficients show the expected signs. In this case, the value for the coefficient of the population variable seems to vary slightly more than in the previous cases but is not significant. A less significant but still negative coefficient appears for firms with less than 50 employees. As will be explain later, the relative distribution of small businesses in sub-sectors of the construction industry may help understand these results.

Table 4. Construction Sector

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.052 *	5.1092 *	5.188 *	5.1121 *	5.0826 *
log_pop_25_edu_2000	0.3449 *	0.3501 *	0.3485 *	0.3441 *	0.3454 *
log_loc_gov_rev_per_cap	-0.0665 ***	-0.0789 **	-0.0966 *	-0.0774 **	-0.0714
log_pop_2007	0.0155	0.0108	0.00473	0.00883	0.0123
log_per_con_less_5	-0.0149	na	na	na	na
log_per_con_less_10		-0.1551	na	na	na
log_per_con_less_20			-0.5827 *	na	na
log_per_con_less_50				-0.9064 **	na
log_per_con_less_100					-0.9504
Total R-Square	0.4334	0.4388	0.4583	0.4468	0.4383
Degrees of freedom	186	186	186	186	186

* significant at 1%, ** significant at 5%, and *** significant at 10%

Table 5 shows the results for the other services sector. Similar to construction, there are a couple of firm class sizes with statistically significant *negative* coefficients; the less than 10 and the less than 50 employees. These results are less robust than previous sectors as the coefficients for population are not significant in the different models.

Table 5. Other Services Sector

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.0612 *	5.0871 *	5.0769 *	5.1107 *	5.0653 *
log_pop_25_edu_2000	0.3377 *	0.3297 *	0.3374 *	0.3083 *	0.3372 *
log_loc_gov_rev_per_cap	-0.0674 ***	-0.0701 **	-0.0708 **	-0.0737 **	-0.0664 ***
log_pop_2007	0.003926	0.002652	0.0114	-0.00079	0.0113
log_per_oth_svc_less_5	-0.2211 **	na	na	na	na
log_per_oth_svc_less_10		-0.3913 **	na	na	na
log_per_oth_svc_less_20			-0.2762	na	na
log_per_oth_svc_less_50				-3.6621 **	na
log_per_oth_svc_less_100					-3.427
Total R-Square	0.4476	0.445	0.4347	0.4506	0.4348
Degrees of freedom	186	186	186	186	186

* significant at 1%, ** significant at 5%, and *** significant at 10%

Finally, table 6 shows the results for the transportation sector. Here, also, unexpectedly, there are some negative relationships between the less than 10 and the less than 20 employees firms and the income level. The other coefficients show the expected signs. Similar to the construction sector, these results can be better understood when analyzing the relative wages paid by sectors and sub-sectors.

Table 6. Transportation and Warehousing Sector

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	5.037 *	5.125 *	5.1304 *	5.0745 *	5.0475 *
log_pop_25_edu_2000	0.3439 *	0.3431 *	0.3408 *	0.3434 *	0.3433 *
log_loc_gov_rev_per_cap	-0.0623 ***	-0.0847 **	-0.0837 **	-0.0679 ***	-0.0644 ***
log_pop_2007	0.0169	0.009681	0.00794	0.0108	0.0151
log_per_trn_less_5	0.015	na	na	na	na
log_per_trn_less_10		-0.1448 **	na	na	na
log_per_trn_less_20			-0.2638 **	na	na
log_per_trn_less_50				-0.3378	na
log_per_trn_less_100					-0.1344
Total R-Square	0.4335	0.4456	0.4483	0.437	0.4335
Degrees of freedom	186	186	186	186	186

* significant at 1%, ** significant at 5%, and *** significant at 10%

Sectors and relative wages

As was mentioned before, relative wages paid by different sectors and sub-sectors can explain the different results obtained in the regression analyses. Table 7 shows the average payroll by sectors for Texas, using a 2-digit NAICS classification.

Table 7. Texas

NAICS	Industry code description	Avg payroll 2007 *	Avg size by employees
	Total	$41,260	17
55	Management of Companies and Enterprises	$111,741	60
22	Utilities	$84,988	23
52	Finance and Insurance	$61,605	12
51	Information	$60,593	27
54	Professional, Scientific, and Technical Services	$67,649	10
21	Mining	$58,349	31
42	Wholesale Trade	$57,209	15
31	Manufacturing	$49,715	40
48	Transportation and Warehousing	$43,703	23
23	Construction	$45,067	14
53	Real Estate and Rental and Leasing	$41,641	7
62	Health Care and Social Assistance	$37,339	21
61	Educational Services	$30,273	25
11	Forestry, Fishing, Hunting, and Agriculture Support	$31,108	7
56	Administrative and Support and Waste Management and Remediation S	$28,648	37
71	Arts, Entertainment, and Recreation	$26,334	18
81	Other Services (except Public Administration)	$24,149	9
44	Retail Trade	$23,633	15
99	Unclassified	$18,438	2
72	Accommodation and Food Services	$13,815	20

* The average payroll is equal to total annual payroll divided by employment in March of 2007

Source: County Business Patterns, 2007

According to the table, the average payroll per worker for Texas in 2007 was $41,260, considering the annual payroll paid by the industries and the employment as of March of that year. From the six sectors studied, four show higher than average payrolls: professional, scientific, and technical services; manufacturing; transportation and warehousing; and construction. On the other hand, two sectors show payrolls below the state average: health care and social assistance; and other services. It seems counterintuitive that the regression results showed that transportation and warehousing; and construction activities showed negative relationships with the counties' median household incomes when these sectors have above state average payrolls per worker. Also, it seems counterintuitive that the health care and social assistance sector showed a positive relationship with respect to counties incomes when it has a below state average payroll per worker.

Tables 8 and 9 help in understanding some of the regression results. Table 8 shows the average payroll for the professional, scientific, and technical services sector for the 1-4 employees class size divided into nine sub-sectors. Out of the total number of the establishments in this sector for that particular class size, 25 percent of the firms correspond to legal services, 13 percent correspond to the computer systems design and related services, 12 percent correspond to the architectural and engineering services, close to 8 percent correspond to other related services (included scientific research and development); all of these activities have an average payroll well above the state average. Therefore, it would not be surprising that these sectors contribute positively to the income level of the counties where these small businesses are located.

Table 8. Professional and Technical Services Sector

NAICS	Industry code description	Avg payroll 2007 *	Percentage of establishments in the 1-4 employees class (2007)
54	Professional, Scientific, and Technical Services	$67,649	100.00%
5411	Legal Services	$73,935	25.35%
5416	Management, Scientific, and Technical Consulting Services	$70,264	19.89%
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	$42,411	14.56%
5415	Computer Systems Design and Related Services	$75,289	13.45%
5413	Architectural, Engineering, and Related Services	$78,431	12.07%
5419	Other Professional, Scientific, and Technical Services	$33,619	6.75%
5418	Advertising and Related Services	$54,881	3.63%
5414	Specialized Design Services	$51,092	3.18%
5417	Scientific Research and Development Services	$89,032	1.11%

* The average payroll is equal to total annual payroll divided by employment in March of 2007

Table 9 tells a similar story but in a different context. The sector of health care and social assistance services has an average payroll per worker ($37,339) below the state average. But when analyzing the percentage of small businesses in the 5-9 employees class size, it appears that more than 80 percent of these firms operate in the sub-sector ambulatory health care services with an average payroll of $42,543, which is above the state average. This sub-sector includes offices of dentists and physicians among others. Therefore, the positive contribution of small businesses, for that class size, to income levels in this industry is not surprising.

Table 9. Health Care Sector

NAICS	Industry code description	Avg payroll 2007 *	Percentage of establishments in the 5-9 employees class (2007)
62	Health Care and Social Assistance	$37,339	100.00%
621	Ambulatory Health Care Services	$42,543	80.97%
622	Hospitals	$45,809	0.18%
623	Nursing and Residential Care Facilities	$22,184	4.46%
624	Social Assistance	$16,522	14.39%

* The average payroll is equal to total annual payroll divided by employment in March of 2007

Tables 10 and 11 tell us a different story. While both sectors, construction on one hand, and transportation and warehousing, on the other, have both average payrolls per worker above the state average, in both cases the distribution of the small businesses across different sub-sectors may help explain the negative relationships observed in the regressions.

Table 10. Construction Sector

NAICS	Industry code description	Avg payroll 2007 *	Percentage of establishments in the 10-19 employees class (2007)
23	Construction	$45,067	100.00%
236	Construction of Buildings	$52,529	18.16%
237	Heavy and Civil Engineering Construction	$51,071	11.43%
238	Specialty Trade Contractors	$39,955	70.40%

* The average payroll is equal to total annual payroll divided by employment in March of 2007

In the case of the construction sector, even though the sectors' average payroll of $45,067 is above the state average ($41,260), more than 70 percent of the small businesses in the 10-19 employees class size operate in the specialty trade contractors sub-sector that has a below average payroll per worker. This, in turn, might explain the negative relationship between the percentage of small businesses in this sector and the counties' median household income. Notice that there are two other sub-sectors that have payrolls above the average but their share of firms is less than a third of the sector.

Table 11 shows the situation for the transportation and warehousing sector. Similarly to the construction sector, there are several sub-sectors with less than the state average payroll per worker. These sub-sectors account for close to 64 percent of the establishments: truck transportation, transit and ground passenger transportation, couriers and messengers, among others all have below average payrolls.

Table 11. Transportation and Warehousing Sector

NAICS	Industry code description	Avg payroll 2007 *	Percentage of establishments in the 5-9 employees class (2007)
48	Transportation and Warehousing	$43,703	100.00%
481	Air Transportation	NA	2.52%
483	Water Transportation	$63,117	0.66%
484	Truck Transportation	$40,074	46.00%
485	Transit and Ground Passenger Transportation	$21,158	3.65%
486	Pipeline Transportation	$99,213	4.38%
487	Scenic and Sightseeing Transportation	$20,402	0.51%
488	Support Activities for Transportation	$42,421	28.70%
492	Couriers and Messengers	$34,673	5.40%
493	Warehousing and Storage	$35,313	8.18%

* The average payroll is equal to total annual payroll divided by employment in March of 2007

Finally, table 12 shows the payrolls for the other services sector. Here, the relationship is clear when paying attention to the low average payrolls of each sub-sector in this industry. With an average payroll below the county average, small businesses operating in this industry will, in effect, lower the counties' household median incomes.

Table 12. Other Services Sector

NAICS	Industry code description	Avg payroll 2007 *	Percentage of establishments in the 1-4 employees class (2007)
81	Other Services (except Public Administration)	$24,149	100.00%
811	Repair and Maintenance	$34,094	34.29%
812	Personal and Laundry Services	$20,138	26.36%
813	Religious, Grantmaking, Civic, Professional, and Similar Organizations	$20,100	39.35%

Conclusion:

Despite the different relationships with respect to income levels, small businesses play a very important role in the creation of jobs supported by the private sector. The strong statistically positive relationship between counties median household income and the percentage of small business establishments, particularly in regards to the professional, scientific, and technical services sector, as well as the health care sector, highlights one aspect of the impacts of small businesses in the state of Texas.

The difference between job growth and income growth though not consistent across sectors nor across business size, can be related to the ensuing analysis of small business clusters because they highlight the sectors where there is a positive association between business activity and income, and wealth, creation.

The clustering of businesses in a region and the distribution of these businesses by size and sector and determining the aggregate economic impact small businesses have on the state economy will be the subject of future reports.

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