

An Empirical Assessment of the Contribution of Small Business Employment to U.S. State Economic Performance

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ABSTRACT. Small business proponents regularly couple their arguments for favorable government policies and reduced tax and regulatory burdens, to the presumed benefits of increased proportions of small versus large-sector employment. Though regularly espoused at both the state and national level, these presumptions regarding the benefits of small business employment remain an empirical issue. Are the presumed benefits a reality? A panel analysis of 48 U.S. States for a ten-year period was used to evaluate the contribution of small businesses to growth in productivity, growth in Gross State Product (GSP), unemployment, and wage inflation at the state level. The system of simultaneous equations revealed that states with higher proportions of very small business employment do indeed experience higher levels of productivity growth, and Gross State Product growth, while having less wage inflation and lower unemployment rates.

Introduction

Small business advocates champion the positive contributions that small businesses have on productivity and employment. The mechanisms by which small businesses were presumed to contribute to macroeconomic expansion and health have been described for over half a century. According to Schumpeter (1934, 1942), small firms make two indispensable contributions to the American economy. First, they are an integral part of the renewal process that pervades and defines market economies – indeed they change market structure. Second, small businesses are the

essential mechanism by which millions, including women, minorities and immigrants enter the economic and social mainstream of American society and access the American Dream.

The encouragement of small businesses is an important goal of modern governments (Denes, 1997). The seminal Small Business Act of 1953 has been supplemented with a series of legislation designed to ease the regulatory burdens on small businesses (White, 1982; Brock and Evans 1986). However, the benefit of small businesses to a state's economy remains an empirical macroeconomic issue. While the growth in small business employment has been explosive, it has not been evenly dispersed across states in the U.S. This difference in the proportion of individuals employed by small businesses across states provides a fertile testing ground for tangible benefits of small business employment.

This paper proposes a relationship between the proportion of small business employment within a state and four economic determinants: productivity, Gross State Product (GSP), wage inflation, and unemployment. We use panel data to estimate two systems of simultaneous equations on the 48 contiguous U.S. States for the period 1986 to 1995. The purpose of these estimations is to address whether or not the small business proponents' claims regarding the benefits of small business employment – and their subsequent calls for further legislative reform to facilitate small business formation within states – are empirically justified? More specifically, how do small businesses affect state labor markets and product markets?

Final version accepted on November 3, 2000

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Small Business Economics 15: 293–302, 2000.
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Literature review

The literature supporting the virtues of small businesses versus large businesses may be divided into two streams: product market effects, which include productivity and innovation, and labor market effects, which include wage inflation and unemployment.

Product market effects

Many consider the rise in small firm employment to be directly related to the sectoral shift within the U.S. from manufacturing to services. However, recent findings show that between 1990 and 1995 small businesses create new jobs in the manufacturing sector at rates comparable to the service sector (Bednarzik, 2000). According to Acs and Audretsch (1990, 1993), the development of small-scale, flexible production technologies has enabled small firms to flourish in the manufacturing industry. Carlsson (1989, 1990) detailed the operational, tactical, and strategic advantages that flexible manufacturing afforded small businesses.

The flexibility and creativity fostered in small manufacturing firms has enhanced their productivity. Further evidence of small business productivity has been provided by numerous studies supporting the notion that small businesses are generally more innovative than large businesses in terms of innovations per dollar of research and development, and innovations per employee (Holton, 1965; Bannock, 1981; Acs and Audretsch, 1988; LaFalce, 1990; Pratten, 1991; Almeida and Kogut, 1997). It would appear that the ability to develop and transfer technology is a distinctive competency of small firms.

Providing further evidence, the research firm Cosmetics, Inc. traced the employment and sales records of some 9 million companies via Dun & Bradstreet files (Kuratko and Hodges, 1998). They found that new and smaller firms have been responsible for 55 percent of the innovations in 362 different industries, and 95 percent of all radical innovations over the past ten years. The company also found that small businesses produced twice as many product innovations per employee as did larger firms and obtained more patents per sales dollar than larger firms.

According to J. W. Glover, Chief Counsel for

Advocacy, U.S. Small Business Administration, small businesses play a critical role by efficiently reallocating the state's resources and injecting new ideas into the economy with business starts and stops. As sources of constant experimentation and innovation, small businesses play an integral role in the renewal processes that define a market economy and change market structure (Acs and Audretsch, 1999). This is referred to as "churning" and is at the theoretical heart of the proponents' arguments as to why small business is good business in terms of state and national welfare (Headd, 1998).

Churning is the cycle of change that results in the continual reallocation of our nation's financial, material and human resources, presumably to their higher valued uses. As described by Headd (1998, p. 8), "Firm births and deaths are part of the cycle of change that reallocates the economy's finance, employment, and material resources. Firms are often born and survive by applying new ideas and new vigor, replacing outmoded firms. These start-up firms may need to grow to reach an optimal size to take advantage of scale economies. Small firms are the driving force behind this cycle. Most firms start small and never grow to become large firms (or shrink before they die)."

More recently, Bednarzik (2000) found nearly six million jobs created from establishment births in the U.S. over the 1995–1996 period – 3.3 million of these from births of original establishments while 2.7 million births were extensions of existing establishments (such as opening a new Wal-Mart). He found that very few businesses start big; churning occurs with the birth of original establishments that are typically small – 94% in firms with less than 500 employees. As summarized by Acs (1999, p. x), "the crucial barometer for economic and social well-being is continued high level of creation of new and small firms in all sectors of the economy."

A final positive attribute of small businesses involves their enrichment of worker talents and capabilities. According to a recent study by the SBA, small businesses are the leaders in offering training and advancement opportunities to workers. Small businesses require a more general and diverse set of skills from their workers, unlike the specialized training predominant among large corporations. Consequently, the small companies

offer more general skills instructions, and training for their employees. Often the nature of the training is more informal and on the job, but over time the employees are enriched with a wider range of valuable skills, such as verbal and written communication and computer literacy (Bowles, 1994).

Labor market effects

A second general set of enhancement factors afforded by small businesses involves their effects on labor markets and human resources. Small businesses maximize the utility of labor and capital through their ability to utilize secondary, or less attractive, resources in the marketplace. The secondary market consists mainly of first time entrants into the job market, the long-term unemployed, individuals at low educational levels, part-time employees, women, certain minorities, immigrants, short-term workers, the previously self-employed and workers under the age of twenty. While big businesses and global corporations in Asia, Europe, and the U.S. deal mainly with the primary labor market, small businesses have a greater presence in the secondary labor market. Employment in the U.S. has risen by 14 million over the past six years while remaining relatively stagnant in Europe and Asia; a disparity due to differences in competition, entrepreneurship, and new firm startups (Acs, 1999). The growth has been fueled by small business employment of unskilled workers from the secondary labor market in the service sector (Bednarzik, 2000). Participants in the secondary labor market usually are not represented by unions, and typically receive less compensation and benefits. Many of the jobs in this secondary market may be in low-tech, or no-tech businesses that provide distribution and service networks to support high-tech producers (Solomon, 1986). Thus, in the U.S. small businesses are an essential mechanism by which millions enter the economic and social mainstream (Acs, 1999).

Binks and Jennings (1986) stress the role played by small businesses in providing insulation against the deleterious effects of recession as one of the primary benefits of small businesses. They conclude that when recessions occur and large businesses lay-off employees, a significant number

of the displaced employees either start small businesses or are absorbed into employment by the small business sector. Bednarzik's (2000) findings support this claim. Over the most recent business cycle with a peak in 1990 and trough in 1991, existing business employment was clearly cyclical. In contrast, he found that the birth of new establishments was unrelated to the business cycle: employment growth from new establishments remained between 5.6 percent and 7.1 percent per year from 1989 to 1996.

Small businesses have a positive impact on employment. The rate of small business growth has approximately doubled in the last 20 years. Furthermore, small businesses accounted for two thirds of the net new jobs created between 1970 and 1990 (Dennis, 1993). Between 1987 and 1993 small firms created 5.8 million new jobs, while large firms experienced a net loss of 2.3 million jobs (Byrne, 1993).

Acs and Audretsch (1992) state that the enlargement of small and medium size firms has expanded employment in the U.S. Further evidence is provided in a study reported by Reynolds (1992), who found that high employment is associated with an increase in new firm birth rates. As a counterbalance to economic downturns, the contribution and economic reserve of smaller businesses produce the adaptability needed to buffer the economy. Thus small businesses provide a safety net against unemployment by big businesses. In fact, according to Solomon (1986, p. 73) "small business can create a disproportionate number of new jobs when other important economic entities like big business and government can't." The smoothing influence of small firms on overall employment must be significant given that between 1995 and 1996, 80.8 percent of jobs lost were in firms with over 500 employees (Bednarzik, 2000).

Another often cited positive benefit of small businesses is their stifling effect on wage inflation. Solomon (1986) finds that small businesses on average pay 20 percent lower wages than big business. He adds that the small business reaction to inflation is to work harder, and to absorb the resource cost hikes of goods and services whereas big businesses' reaction is to pass their costs on to the consumer in the form of higher prices. Solomon (1986, p. 46) explains that "The small

business economy is more or less self adjusting. In practice, it tends to act as a cushion for the economy in a downturn and as a brake in inflationary periods.” Highfield and Smiley (1986) indicate that as inflation declines, the number of small firms increases (as measured by the numbers of new business incorporations). It appears that small businesses pay workers lower wages during periods where workers may be unable to find employment in the large employment sector.

In situations where wages and unemployment are artificially high because of unionization and other factors in the economy, small businesses have been successful in increasing their share of employment by creating low-wage jobs. According to Boden (1996), new hires in small firms received 93 percent of the wages of newly hired workers in large firms. Another way small businesses have competed is to become a less expensive niche supplier of component parts demanded by big business. In summary, the ability of small business to create low wage jobs has “helped the U.S. reduce inflation without paying a punitive price in unemployment” (Solomon 1986, p. 86).

Methodology

For a panel study using state data, the presence of econometric issues of multicollinearity, autocorrelation, and heteroscedasticity must be acknowledged and addressed. Running single equation unadjusted estimation techniques would reveal all of these econometric problems. Several steps have been taken within this panel study to address each issue. Using rates of change mitigates heteroscedasticity and autocorrelation. Incorporating lagged variables is a control for autocorrelation and provides a measure of persistence. The use of a system of simultaneous equations controls for multicollinearity and is a preferred method for testing in the presence of heteroscedasticity. The simultaneous equations technique is equivalent to a three stage least squares estimation with instrumental variables. We estimate the system as a random effects system. The strength of small business employment is not driven by geographic factors, hence the variation in this model is expected to be as significant within regions as between regions.

We estimate two separate pairs of simultaneous equations, with each pair containing two equations. The first pair combines GSP growth with productivity growth. The second pair addresses the classic Phillips relation by estimating rates of unemployment and wage inflation. The pairs of equations were pre-selected because of the theoretical and empirical interdependency (endogeneity) of the dependent variables. Thus, the rates of productivity growth and GSP growth are determined simultaneously in the product market (see Pantuosco et al., 2000). The rates of unemployment and wage inflation are determined simultaneously in the labor market (Hyclak and Johnes, 1992; Pantuosco et al., 2000, Pantuosco and Parker, 1999). Each equation contains a constant, the lagged dependant variable, and a feedback component, which is the dependent variable from the other equation. Small business employment is added in each pair as an independent variable. Other variables are included as controls.

We estimate two sets of equations for each pair. The estimations within each pair are identical with one exception: one set defines small businesses as those with 20 employees or less. The other set defines small businesses as companies with 500 employees or less. These categorizations of firm size were chosen based on commonly cited SBA classifications. The ten years (1986–1995) of panel data for 48 states with lagged variables provides 432 observations. Panel data is subject to random and fixed effects. To assess the robustness of our results state, regional, and time dummies were incorporated into the simultaneous equations to capture any fixed effects.

Model

Small businesses in the product market. The statistical specification contains the joint determination of GPS growth and productivity growth.

$$\begin{aligned} \text{PROD} = & b_0 + b_1 \times \text{lagPROD} + b_2 \times \\ & \text{SMALLBUS} + b_3 \times \text{GSP} + b_4 \times \\ & \text{lagUR} + b_5 \times \text{WAGINF} + e \end{aligned} \quad (1)$$

$$\text{GSP} = a_0 + a_1 \times \text{lagGSP} + a_3 \times \text{PROD} + e \quad (2)$$

Here PROD is the annual productivity growth rate. GSP is the annual growth of the GSP. LagGSP and

lagPROD are the lags of the dependent variables. SMALLBUS is the percent of the employed in small businesses. lagUR is the annual lagged unemployment rate. WAGINF represents the annual changes in wages, and e is an error term.

Based on our earlier discussion we expect the SMALLBUS to have a positive effect on productivity. Small businesses' positive impact on innovation (LaFalce, 1990; Kuratko and Hodges, 1998) and churning (Headd, 1998) should translate into increased productivity growth.

The unemployment rate has a positive impact on productivity. An increase in unemployment may be caused by a reduction in employment. If this decline in employment has minimal effects on output then productivity will rise. Furthermore, when unemployment rates increase workers are less likely to shirk. As other employment opportunities decrease workers put forth greater effort on the job (Shapiro and Stiglitz, 1985).

An increase in wages is expected to have a positive effect on productivity. Katz (1986) states that compensating workers with above market wages will enhance productivity by creating a more motivated group of employees, who are less likely to turnover. In the case of unions, Freeman and Medoff (1984) claim that paying members

above market wages results in a more organized, manageable, and productive work force. Addison and Hirsch (1989) add to the literature, by claiming that productivity can increase through a "wage effect". Simply put, the conventional wisdom is that workers put forth a greater effort because they are paid more.

The feedback terms in both equations are expected to be positively correlated. Controlling for employment changes, increases in productivity will be met with increases in GSP.

Results

The results from the regression analysis are reported in Table I. Columns 1 and 2 report the results from the simultaneous analysis of production growth and growth in GSP when the small business measure is employment by "firms with less than 20 employees." Columns 3 and 4 repeat the estimation with the small business variable based on employment by "firms with fewer than 500 employees."

In the first set of estimations for very small businesses under 20 employees, employment by small businesses has a positive significant effect on productivity growth. However, these positive

TABLE I
Product market estimates (absolute t -statistics)

	Under 20		Under 500	
	Prod growth	GSP growth	Prod growth	GSP growth
Constant	-0.037 (7.7)***	0.014 (9.1)***	-0.032 (4.2)***	0.014 (9.1)***
Lagged Dep	-0.197 (3.9)***	0.212 (4.7)***	-0.200 (4.1)***	0.210 (4.6)***
Feedback	1.33 (17.4)***	0.745 (20.2)***	1.35 (21.5)***	0.739 (23.7)***
UR lag	0.109 (3.7)***		0.103 (3.6)***	
Wag Inf	0.034 (1.4)*		0.011 (0.47)	
Small business	0.019 (2.1)**		0.004 (0.29)	
R-squared	0.44	0.55	0.45	0.55
N	432			

*** Significant at 0.01; ** significant at 0.05; * significant at 0.10.

effects are not witnessed among the larger small businesses under 500 employees. States that encourage the growth in small business employment will see an increase in productivity growth if they focus their policy efforts on the very small businesses. Productivity growth in turn provides a positive feedback to GSP growth. Hence the state economies where small businesses prosper grow faster than states where employment is heavier in large companies.

GSP growth and productivity growth are significantly interrelated. GSP growth has a positive feedback on productivity growth and growth in productivity is positively linked to GSP. The constant and lag coefficients for GSP provide evidence on the underlying base for growth and the persistence of growth. This suggests a base growth rate in GSP of 1.4%. The adjustment time is rather quick, only 21% of the previous period's growth persists.

The lagged unemployment rate and wage inflation are inserted as labor market control variables. The employment link is displayed by the positive impact from lagged unemployment rates. The lagged unemployment rate had the expected sign and is significant. When unemployment rises presumably the least productive worker is laid-off first. Thus, increases in unemployment raise productivity measures. Wage inflation is also positively linked to productivity growth, but is not significant.

Small businesses in the labor market

The second pair of simultaneous equations addresses the joint determination of unemployment rates and wage inflation.

$$\begin{aligned} \text{WAGINF} = & a_0 + a_1 \times \text{UR} + a_2 \times \text{SB} + a_3 \\ & \times \text{UNION} + a_4 \times \text{GSP} + a_5 \\ & \times \text{POP} + a_6 \times \text{EDU} + e \end{aligned} \quad (3)$$

$$\begin{aligned} \text{UR} = & b_0 + b_1 \times \text{LAGUR} + b_2 \times \text{LAGGSP} \\ & + b_3 \times \text{WAGINF} + e \end{aligned} \quad (4)$$

UR is the annual unemployment rate; POP is the annual change in the population; EDU is the percentage of the population with bachelor degrees. UNION is the percent of the employed workers who are union members.

Small Businesses are expected to be negatively correlated with wage inflation within an economy (Solomon, 1986). Small businesses on average pay less than large businesses and for a given unemployment rate the higher the percentage of workers employed by small business the lower the inflationary pressures.

The coefficient for the unemployment variable in the wage inflation equation captures the Phillips relation (Phillips, 1958). In a survey of 48 states and 16 large metropolitan areas, Hyclak and Johnes (1992) find the Phillips relationship intact. In their two-equation model, their estimates indicate a negative correlation between the rates of unemployment and wage inflation. If the state level Phillips curves differ, then states with lower Phillips curves exhibit less unemployment for a given level of wage inflation. A negative estimate of a_2 is empirical evidence that small businesses lower the state's Phillips curve.

The union monopoly theory states that unions increase the wages of their members while reducing overall employment. In a study of U.S. states Pantuosco et al. (2000) determined that over the past two decades states with relatively high levels of union density experienced greater wage inflation than low union states. In an inter-industry analysis Linneman et al. (1990) find that relative to wages in the nonunion sector and in the employment growth industries, union rents have increased. Also, the efficiency wage theory supports the claims that unions increase wage inflation (Summers, 1986).

We expect that increases in the GSP will lead to increases in wage inflation. Evidence in the 1990s indicates that increases in the GSP have led to a tighter labor market, and thus an increase in wages (Feldstein, 1998).

In the unemployment equation, the coefficient of the lagged dependent variable estimates the speed of adjustment for unemployment rates. The closer this coefficient is to one, the slower the adjustment process. The lagged unemployment rate is expected to have a negative impact on GSP growth (Okun, 1962). Education is added as a labor market demographic control measure (Partridge and Rickman, 1995). Population growth is a proxy for changes in migration (Eberts and Stone, 1992).

TABLE II
Labour market estimates (absolute *t*-statistics)

	Under 20		Under 500	
	UR	Wage inflation	UR	Wage inflation
Constant	0.033 (7.1)***	0.052 (8.2)***	0.016 (7.2)***	0.016 (0.84)
Feedback	-0.379 (5.2)***	-0.322 (5.9)***	-0.041 (1.6)*	-0.176 (3.1)***
Lagged Dep	0.674 (17.6)***		0.78 (31.4)***	
GSP lag	-0.055 (3.9)***	0.203 (7.8)***	-0.088 (5.9)***	0.195 (6.5)***
Union		0.012 (1.3)		0.042 (3.2)***
Small business		-0.033 (2.6)***		0.017 (0.6)
Pop. growth		-0.166 (3.8)***		-0.046 (0.8)
Education		0.0005 (2.3)**		0.0009 (2.5)***
R-squared	0.63	0.16	0.76	0.16
N	432			

*** Significant at 0.01; ** significant at 0.05; * significant at 0.10.

Results

The results from the second set of regressions are reported in Table II. Columns 1 and 2 report the results from the simultaneous analysis of unemployment rates and wage inflation when the small business measure is employment by firms with less than 20 employees. Columns 3 and 4 repeat the estimation with the small business variable based on employment by firms with fewer than 500 employees.

Employment by small businesses has a negative significant effect on wage inflation in the estimations for very small businesses but not for larger small businesses. States that encourage the growth in very small business employment will see a larger decrease in wage pressure if efforts are focused on those very small businesses with fewer than 20 employees. This evidence supports the claim that small businesses may indeed hire secondary market employees. These workers are

paid less possibly because of their marginal skill level, or labor market commitment.

Wage inflation provides a negative feedback to the unemployment rate. As expected, the results indicate that the lagged measure of growth in GSP has a significant negative impact on unemployment rates. The constant term of the wage inflation equation for very small businesses reveals a positive trend while the constant in the unemployment rate equation for very small businesses reveals a base unemployment rate of 3.3%. In addition, the lagged coefficient of 0.67 indicates that unemployment rates are relatively slow to adjust.

The coefficient of the unemployment rate in the wage inflation equation can be interpreted as the slope of the classic Phillips curve. From column 2, a one-percentage point decrease in unemployment raises wage inflation by 0.32 percentage points. However, the presence of small business will significantly lower the levels associated with



Figure 1. Small business adjusted Phillips Curve.

this tradeoff. Figure 1 illustrates the results when the different levels of state small business employment are evaluated in this relationship. The top line shows the Phillips relationship ignoring the impact of small businesses.

The 1995 data for Massachusetts and Montana are used to compare the impact small businesses can have on a state economy. The percentage of employment in small businesses in Massachusetts is among the lowest in the country. In contrast, Montana has one of the highest rates of small business employment. Consequently for a given rate of wage inflation, say 3.5%, the corresponding unemployment rate is significantly lower for Montana. It should be emphasized that these results again are based on the estimation of the impact of the very small employers. The same results are not found when the larger employment size of firms up to 500 employees is included in the estimation. This diversity of unemployment tradeoffs by state suggests that the effectiveness of a given national policy aimed at unemployment or inflation will have predictable state and regional distribution effects.

In both sets of equations education has a positive impact on wage inflation, which indicates a positive return on investment in human capital. Population growth decreases wage pressure in the set of equations that include very small businesses, but population is not significant in the labor market equations for larger small businesses.

Conclusion

This paper has analyzed the influence that small business employment has on economic activity at the U.S. State level. The study finds that “very” small businesses do indeed provide many of the macroeconomic benefits championed by small business proponents. States with a higher percentage of very small businesses, 20 employees or less, have a more productive workforce, and higher levels of GDP growth than states with lower levels of very small businesses. Furthermore, states that are rich in very small businesses have lower wage inflation, and lower rates of unemployment. Therefore, macroeconomic policies have more favorable impacts on states with a high percent of very small businesses.

The positive outcomes witnessed by very small businesses were not as apparent for “large” small businesses. In states where the percentage of large small businesses, 500 employees or less, is high the work force is not significantly more productive than states with lower levels of large small businesses.

Definitions and data sources

Definitions (All data are at the state level.)

1. *UR*: The annual unemployment rate.
2. *WAGINF*: The annual percentage change in the wage.
3. *SMALLBUS*: The percentage of workers employed in businesses with fewer than 20 employees, and with fewer than 500 employees.

4. *PROD*: The annual percentage change in the ratio of GSP/employment.
5. *GSP*: The annual percentage change in the gross state product.
6. *POP*: The annual percentage change in the population.
7. *EMP*: The annual percentage change in the number of people employed.
8. All lag variables are one-year lags in the respective variable.

Data sources

1. Small business was defined in two ways, an independently owned and operated firm with fewer than 20 employees, and one with less than 500 employees.
2. Data on employment and unemployment are taken from the U.S. Department of Labor, Bureau of Labor Statistics.
3. Gross state product (GSP) data are from the U.S. Department of Commerce, Bureau of Economic Analysis.
4. Union membership data are from the United States Statistical Abstracts and diskettes from Hirsch and McPherson (1993) and (1997).
5. Wage data are from the U.S. Department of Labor, Employment, and Training Administration.
6. Firms, employment, annual payroll, and estimated receipts by firm size and state by various years are from the U.S. Small Business Administration, Office of Advocacy based on data provided by the U.S. Department of Commerce, Bureau of the Census.

Acknowledgements

The authors wish to thank Steven C. Michael and three anonymous reviewers for their helpful comments on earlier drafts of this article.

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