Temporary help services and the volatility of industry output

Yukako Ono and Alexei Zelenev

Introduction and summary

Many firms today are changing their organizational structures by adopting more flexible staffing arrangements. Such arrangements frequently include hiring temporary workers, on-call staff, and private contractors. Recent surveys reveal that the use of flexible staffing arrangements and, in particular, the use of temporary workers in the U.S. economy has become more widespread.

According to a 1996 Upjohn survey of private employers, as many as 78 percent of establishments used at least one type of flexible staffing arrangements in 1996; 46 percent of establishments employed temporary workers (Houseman, 2001a). The Bureau of Labor Statistics (BLS) data on employment reveal that the temporary help service (THS) industry, which supplies temporary workers, grew by more than 700 percent between 1982 and 2000—THS employment increased from approximately 417,000 to 3,489,600 in that period. The dramatic increase in the use of temporary workers has generated a vigorous debate among economists and policymakers about the costs and benefits of flexible staffing arrangements.

One of the most frequently cited reasons for the adoption of flexible staffing arrangements is that such arrangements allow firms to accommodate unexpected increases and decreases in business activity. By using flexible labor, firms, especially in volatile industries, can meet a surge in demand more efficiently; and if business activity experiences a downturn, firms can reduce their flexible work force without making costly adjustments to their permanent employment levels.

However, very few studies offer direct empirical evidence to support this view. The relationship between the rise and fall in a firm's output and its use of flexible staffing arrangements is not as straightforward as it might seem at first. On one hand, the volatility of output may induce firms to expand the use of flexible staffing arrangements, increasing the aggregate number of flexible workers. But on the other hand, if the demand for flexible labor fluctuates a great deal in response to firms' hiring and laying-off patterns, subcontractors and agencies supplying temporary help might find it difficult to continue providing such services to the market, potentially decreasing the use of flexible labor.

In this article, we conduct a closer examination of the relationship between the fluctuations of output and labor supplied by THS agencies, one of the commonly used forms of flexible staffing arrangements. Using state-level data, we analyze the shares of THS employment in relation to the output volatility of other sectors (non-THS industries) across the U.S. from 1977 to 1997. In order to capture the effect of volatility, we construct an index that measures the degree of fluctuation of industry output in each state. Furthermore, we decompose the volatility index into two components: one that measures the volatility associated with each individual industry; and a second component that measures the *co-movement* of output fluctuations for different industries in the same state. We find evidence that there is a positive association between the level of output volatility and the share of temporary service employment across different states. This result suggests that industries that experience greater fluctuations in output use more THS labor than industries that are relatively stable. Furthermore, we find that the THS shares are lower in the states in which the fluctuations of output are highly correlated among industries, suggesting

Yukako Ono is an economist and Alexei Zelenev is an associate economist at the Federal Reserve Bank of Chicago. *The authors are grateful to their colleagues at the Federal Reserve Bank of Chicago for helpful comments. They particularly thank Dan Aaronson, Helen Koshy, David Marshall, and Dan Sullivan for many detailed comments and suggestions on earlier drafts.*

that the flexibility of labor markets is lower in areas with a high degree of co-movement of output fluctuations across different industries. One possible interpretation is that THS agencies may find it difficult and costly to supply temporary workers to the labor market in areas with a high degree of industry co-movement, where many client firms simultaneously reduce or increase their usage of temporary workers.

THS industry: Trends and issues

The THS industry has been one of the fastest growing industries in the U.S. economy, outpacing many traditional industry sectors (Clinton, 1997). Analysis of recent data surveys reveals that almost all sectors of the economy have expanded their usage of temporary workers. Based on estimation in Estẽvao and Lach (1999), the biggest increases have been in the manufacturing and service sectors; in particular, by 1997, close to 4 percent of employees in manufacturing were employees of THS firms. Other sectors, notably finance, insurance, and trade and construction, have experienced substantial gains over time as well. Although temporary positions often involve clerical and administrative work (more than one-third of all temporary workers hold administrative/clerical positions [Cohany, 1998]), temporary workers represent a wide range of occupations. From lawyers to physicians, from manufacturing to construction workers, the THS industry supplies temporary workers with a diverse range of skills and work experience to the labor market (Rogers, 2000).

THS agencies come in a variety of sizes. Among the largest are Adecco SA, Kelly Services Inc., and Manpower Inc, each of which operates between 2,500 and 5,500 offices in the U.S. and around the world. But there are also many smaller agencies. According to the *1992 Enterprise Statistics* report (U.S. Department of Commerce, Bureau of the Census, 1992), there were 22,223 companies with a total of 32,515 offices that engaged in some kind of personnel supply services in the U.S. Some companies are highly specialized and provide highly skilled workers, such as biological scientists and engineers, while other companies provide workers with more general skills, such as administrative assistants and other office staff (Rogers, 2000).

THS agencies can enhance the efficiency and flexibility of the labor markets in a number of ways. The presence of THS agencies in a region reduces job-search costs and informational asymmetries by helping to match the workers who are looking for a temporary work opportunity with the firms that need temporary help.

For many people, THS employment presents a direct alternative to labor force withdrawal or unemployment. Working for a THS agency may also grant workers more freedom of choice by allowing them to combine work with other activities, such as child-rearing or study, for example. For others, temporary work opportunities can become a route to full-time employment; this route may be especially appealing for workers with little previous experience and/or training. According to a recent study, more than half of employees in temporary positions find permanent jobs within one year of their first interview (Segal and Sullivan, 1997). In addition, THS agencies screen and train their workers. The resulting skills and knowledge may increase workers' productivity and signal to client firms that the workers are motivated and fully qualified; this, in turn, may lead to opportunities for full-time employment. Firms' increased use of THS also implies that the demand for worker screening may be rising (Autor, 2001).

In addition to the advantages of THS employment outlined above, however, there are a number of costs and limitations. On average, temporary workers in non-professional categories receive much lower wages than permanent workers, although they frequently perform the same tasks as permanent staff members (Segal and Sullivan, 1995 and 1998). In addition, some temporary workers work on a permanent basis (so-called "perma temps") without receiving the same benefits and wages as permanent workers. The law does not offer the same protection to temporary workers as it does to permanent employees.[1]

For the client firms, the use of THS provides a number of benefits. The public and private sectors gain the advantage of drawing fairly easily and quickly on temporary workers when confronted by unexpected departures and absences among their permanent work force. The use of temporary workers also allows firms to accommodate fluctuations in business activity more efficiently, for example, a sudden increase or drop in product demand. In fact, more than half the establishments surveyed in 1996 by the Upjohn Institute listed "[the ability of THS agencies to] provide needed assistance at the time of unexpected increase in business [activity]" among their top reasons for using temporary workers (Houseman, 2001a). Increasing costs associated with laying off permanent workers might have led firms to seek flexibility by hiring temporary workers. According to Autor (2003), between 1973 and 1995, 46 states adopted exceptions to the common law doctrine of employment, which limited employers' discretion to fire permanent workers and made them vulnerable to potentially costly litigation; Autor's study found that this change to the legal environment explained 20 percent of the growth of THS during this period.

Flexible labor and volatility: Some evidence

Many economists have noted that the demand for THS employment is very sensitive to the business cycle. Segal and Sullivan (1997) interpret the cyclical sensitivity of the THS industry as an indicator that it provides a buffer for firms that face high costs of adjusting permanent employment. They argue that the flexibility granted by the use of THS workers, coupled with firms' reluctance to adjust their levels of permanent employment, is one of the reasons THS employment is much more volatile than aggregate employment, falling more during contractions and rising more during expansions.

While much research has pointed out the importance of THS labor in helping firms to accommodate fluctuations in output demand more efficiently, there have been few empirical studies that looked at the extent to which temporary labor facilitates flexibility or that have analyzed the association between output volatility and the use of temporary labor. Within the research that does exist, the evidence on the question of whether more volatile industries use more flexible staffing arrangements has been rather mixed and, in some instances, inconsistent.

An example of a study that looks at the relationship between fluctuations of output and THS employment is Golden (1996). Golden finds evidence that a rise in demand for output above the long-run trend produces a strong concurrent rise in demand for temporary labor. Her work suggests that temporary employment facilitates flexibility and allows firms to meet short-term fluctuations in demand and avoid costly adjustments to permanent employment. The evidence she presents seems to be consistent with the buffering hypothesis we mentioned earlier.

However, other studies suggest that greater volatility of output does not increase and might actually decrease firms' demand for flexible staffing arrangements. One example is a paper by Abraham and Taylor (1996), in which they analyze manufacturing establishments' practices of outsourcing business services. Although their analysis does not focus on temporary agencies directly, their study has important implications for understanding the use of THS services, since hiring THS workers can be considered as a kind of outsourcing activity. Using the seasonal fluctuations of industry employment as a proxy for volatility of demand, Abraham and Taylor (1996) find that establishments in more volatile industries appear less likely to contract out various services. In particular, they find that the probability of outsourcing janitorial, machine maintenance, engineering and drafting, and accounting services, on average, decreases as the degree of seasonal volatility rises. Their findings run counter to the story that firms use subcontractors and temporary workers in order to smooth the flow of in-house work during peak periods.

In sum, the existing literature provides mixed evidence for the association between output volatility and the use of flexible staffing arrangements. In reality, whether volatility of product demand will increase or decrease a firm's use of temporary workers may depend on many factors. While greater volatility of output might create greater demand for THS workers, if the demand for temporary workers fluctuates a lot, THS agencies might find it difficult and costly to supply temporary workers to the labor market. For example, during a downturn, THS agencies might face a risk of not being able to reallocate temporary workers from one industry to another, if many client firms are simultaneously reducing their usage of temporary employment; during periods of expansion, THS agencies may have to put more effort into finding suitable matches of temporary workers and clients. As a result, THS agencies may charge a higher premium to client firms, which may make the option of hiring temporary workers less cost-effective.

In this article, we investigate whether there is any evidence for the two different roles that volatility plays in determining the degree of THS usage, by examining the cross-sectional relationship between THS employment share and other sectors' output volatility across U.S. states. In particular, we examine whether there is any evidence that the use of THS is offset by correlated patterns of output fluctuations among industries. And to do this, we calculate a volatility index. In the next section, we describe the procedure that we use.

Measuring output volatility at state level

The amount of goods that firms produce varies from year to year. Firms adjust their production levels in response to changes in market conditions. Changes in consumer demand, as well as changes in the costs of production, can generate positive or negative shocks, resulting in either growth or contraction of industry output. Shocks can be industry-specific, affecting the level of output in one particular industry, or shocks can be common to more than one industry, affecting the level of output of several industries, sometimes in different sectors of the economy. Examples of industry-specific shocks include technological innovation and changes in the price of inputs, which affect industry production; examples of common shocks include changes in interest rates and taxes, which affect the ability of firms in many sectors to borrow and invest in infrastructure.

Fluctuations in output across many industries often are the result of a common shock. The resulting co-movement of output fluctuations of industries that make up a state's economy would comprise an important part of the state's overall output fluctuation. For example, output fluctuations in textile industries are more highly correlated with fluctuations in the apparel industry than in the printing industry. So, *ceterus paribus*, a state with high shares of apparel and textiles is more volatile, on average, than a state that has equally large shares of apparel and printing. The co-location of negatively correlated (or even uncorrelated) industries in a state can produce a kind of stabilizing effect, potentially lowering the volatility of demand for THS and providing a better environment for THS agencies to operate. To capture such an effect, using a method from Conroy (1975) and Diamond and Simon (1990), we decompose the volatility of output into two parts: one part that results from each industry's output fluctuation and another part that results from the correlation of output fluctuations.

To compute the volatility index, we use industry output rather than industry employment, because the size of the permanent work force in each industry can be directly related to the number of temporary workers each industry decides to use. If firms in volatile industries use temporary workers to reduce fluctuations in the permanent staff, then using employment to measure volatility would not uncover any volatility, because permanent employment would not change. (Temporary workers supplied by THS agencies are on the payroll of the THS industry and are not included in employment of the client industry in our data.) Below, we describe the construction of the index in more detail. First, we show how we capture the volatility of each industry's output; then, we show how we compute the volatility for each state in each year.

First, we decompose the growth rate of each industry's output into two components: a secular component g_{it}, which captures the trend growth path, and a cyclical component $\tilde{g}_{it}$, which deviates from the trend value. We call the latter the residual growth rate. The growth rate of industry i in year t can be written as,

1) $growth\ rate_{it} = g_{it} + \tilde{g}_{it}$.

Figure 1 provides an illustration of the relationship between the growth rate and the residual growth rate.

The rise and fall of the residual growth rate $\tilde{g}_{it}$ over time captures the fluctuation of output for industry i, so we use the residual growth rates in our calculations of the index. To obtain the residual growth rate, we use the Bureau of Economic Analysis' (BEA) real gross domestic product (GDP) data for 54 industries[2] for the period between 1978 and 2001. We regress the real growth rate on time for each industry and retrieve the residual terms by taking the difference between the predicted and actual growth rate values.[3] Note that in many industries, the real growth rate of output fluctuates around a certain constant value. In such cases, the residual growth rate will be almost the same as the deviation from the average real growth rate. However, for some industries, there are steady upward or downward changes in the real growth rate during this period, which are captured by the coefficient of time variable. For example, in the case of the food product industry, while the real growth rate moved up and down, on average it was declining between 1978 and 2001. The coefficient of time variable was –0.00382 and statistically significant at the 5 percent level.

FIGURE 1

Relationship between trend growth rate and residual growth rate

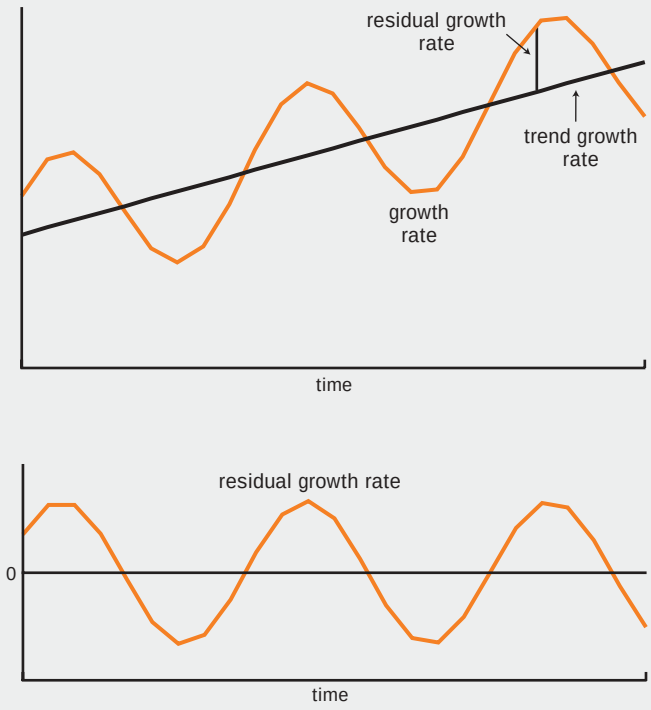


Figure 2 shows the residual growth rates for several selected industries in the manufacturing and service sectors. It is well known that manufacturing industries are more volatile than services. In figure 2, the residual growth rates of manufacturing industries move over much greater ranges than those of service industries.

Next, we use the residual growth rates for each industry to calculate the overall growth of the state economy, which we need to compute our measure of volatility. Since each state has an assortment of many industries, to capture the residual growth rate at the state level, we take a weighted average of the residual growth rates of each industry, treating the industry's employment share in each state as weights. So the state-level residual growth rate, $\tilde{g}_{st}$, can be written as:

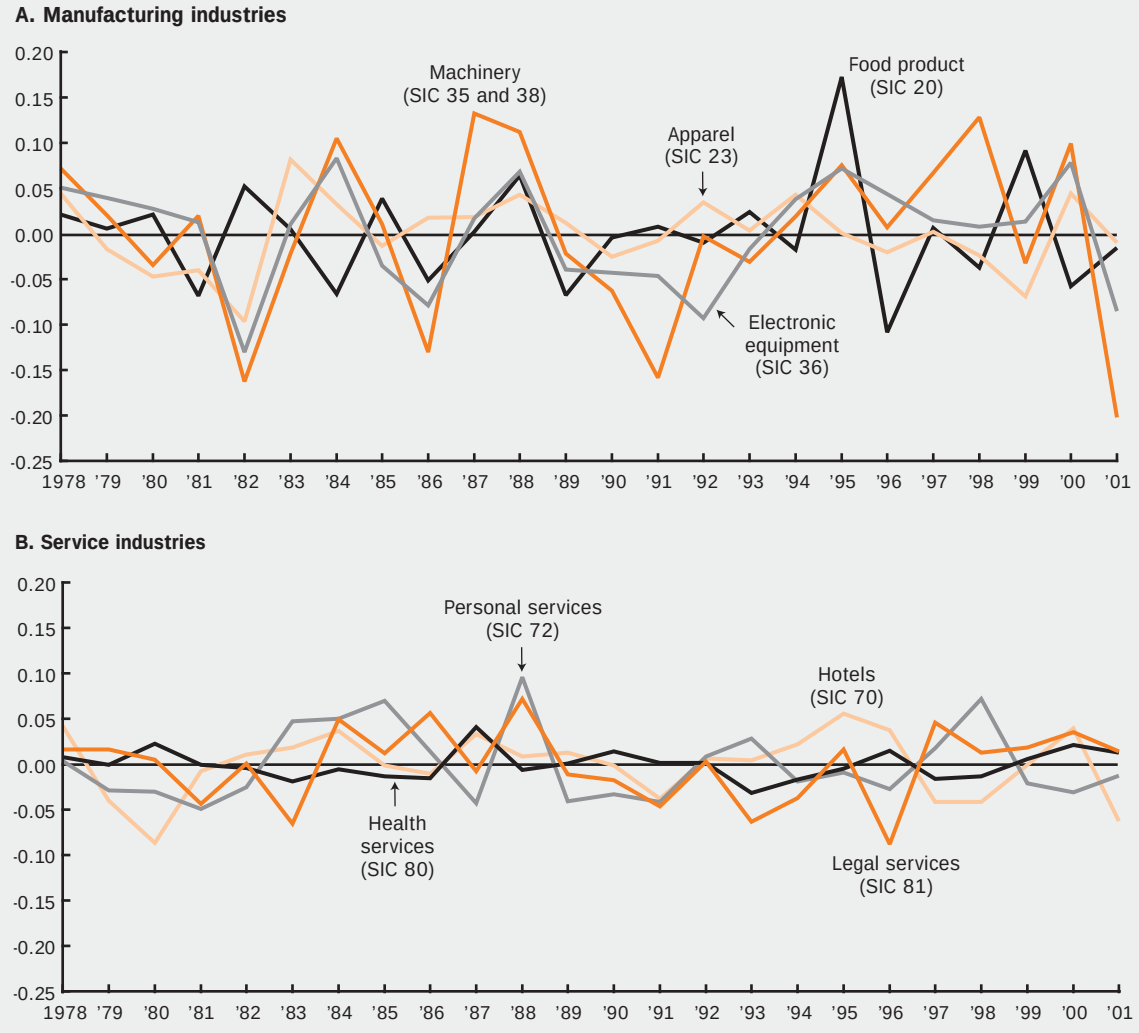
$$2) \quad \tilde{g}_{st} = \sum_i S_{ist} \tilde{g}_{it},$$

where S_{ist} is industry i's share in non-THS employment in state s in year t.[4]

One measure of fluctuations frequently used by economists is variance, which captures the dispersion in the data. Thus, we calculate the variance of the weighted averaged residual growth rates (for each

FIGURE 2

Residual growth rates of output for selected industries



Source: Authors' calculations based on data from the U.S. Department of Commerce, Bureau of Economic Analysis.

state) to quantify the level of output volatility in each state. If the industry fluctuations are independent, the variance of averaged growth rates at the state level, VAR_{st}, can be written as:

$$3) \quad VAR_{st} = \sum_i S_{ist}^2 \sigma_i^2,$$

where σ_i^2 is the variance of the residual growth rate of industry *i*. However, output fluctuations in many industries are actually correlated. In such a case, VAR_{st} will have an additional component, and is written as:

$$4) \quad \underbrace{VAR_{st}}_{\text{Overall volatility}} = \underbrace{\sum_i S_{ist}^2 \sigma_i^2}_{\text{UVAR}} + \underbrace{\sum_i \sum_{i \neq j} S_{ist} S_{jst} \sigma_{ij}}_{\text{CVAR}},$$

where σ_{ij} represents the covariance of the residual growth rates of industries *i* and *j*. We refer to $\sum_i S_{ist}^2 \sigma_i^2$ as the uncorrelated output variance (*UVAR*) and $\sum_i \sum_{i \neq j} S_{ist} S_{jst} \sigma_{ij}$ as the co-movement variance (*CVAR*). *UVAR* measures the volatility when output fluctuations are not correlated among industries, while *CVAR* measures an additional component to the volatility that results when output fluctuations are correlated among industries. In the actual computation of the index, we use sample variances and sample covariance of residual growth rates, which we calculate based on each industry's residual growth rates from 1978 to 2001.

While the output of many industries tends to move together, the degree to which the output fluctuations coincide differs across industries. For example, figure 3, panels A, B, and C show the residual growth rates of each industry for 1982, 1983, and 1984, respectively. During this period, the U.S. economy experienced both recession and expansion. Based on the aggregate GDP data from the BEA, between 1981 and 1982, the real GDP growth rate was –2.02 percent, which was followed by some recovery in 1983 and further expansion in 1984, resulting in real GDP growth of 7.26 percent between 1983 and 1984. Such changes in the growth of the overall economy are reflected in the residual growth rates that we calculated. As shown in figure 3, panels A and C, for most industries, the residual growth rates are negative in 1982 and positive in 1984. However, some industries' growth paths were moving in the opposite direction from most of their peers. Moreover, figure 3, panels A and B show that between 1982 and 1983, the growth rate changed from negative to positive for some industries and remained negative for others. If a state has a majority of industries whose output fluctuates together, this will increase the state's overall volatility. In contrast, if a state has mostly industries whose output fluctuations do not coincide, this will stabilize the overall volatility. Box 1 provides an illustrative example of how the correlation of output fluctuations among industries influences a state's overall output volatility.

Table 1 shows the five most volatile and five least volatile states based on our volatility measures. Between 1977 and 1997, it appears that, on average, output volatility is the highest in Indiana, with an overall output variance of .000760. That is, Indiana's output growth rate deviates from its trend by 2.76 percent, on average. In contrast, the District of Columbia appears to have the lowest volatility at .000231 on average, translating to 1.52 percent deviation of its growth rate from the trend. Table 1 also shows that Indiana experienced the highest volatility, and most of that volatility (81 percent) resulted from the co-movement of output fluctuations among the state's industries. To see how the composition of overall volatility can vary across different states, we can compare North Dakota and Ohio. Overall volatility in Ohio is much greater than in North Dakota. However, table 1 shows that the greater volatility in Ohio relative to North Dakota is due to the greater *CVAR* in Ohio (*UVAR* is almost the same for the two states)—in other words, Ohio is more "volatile" than North Dakota because of the higher degree of co-movement exhibited by Ohio's industry mix.

Empirical specification and data

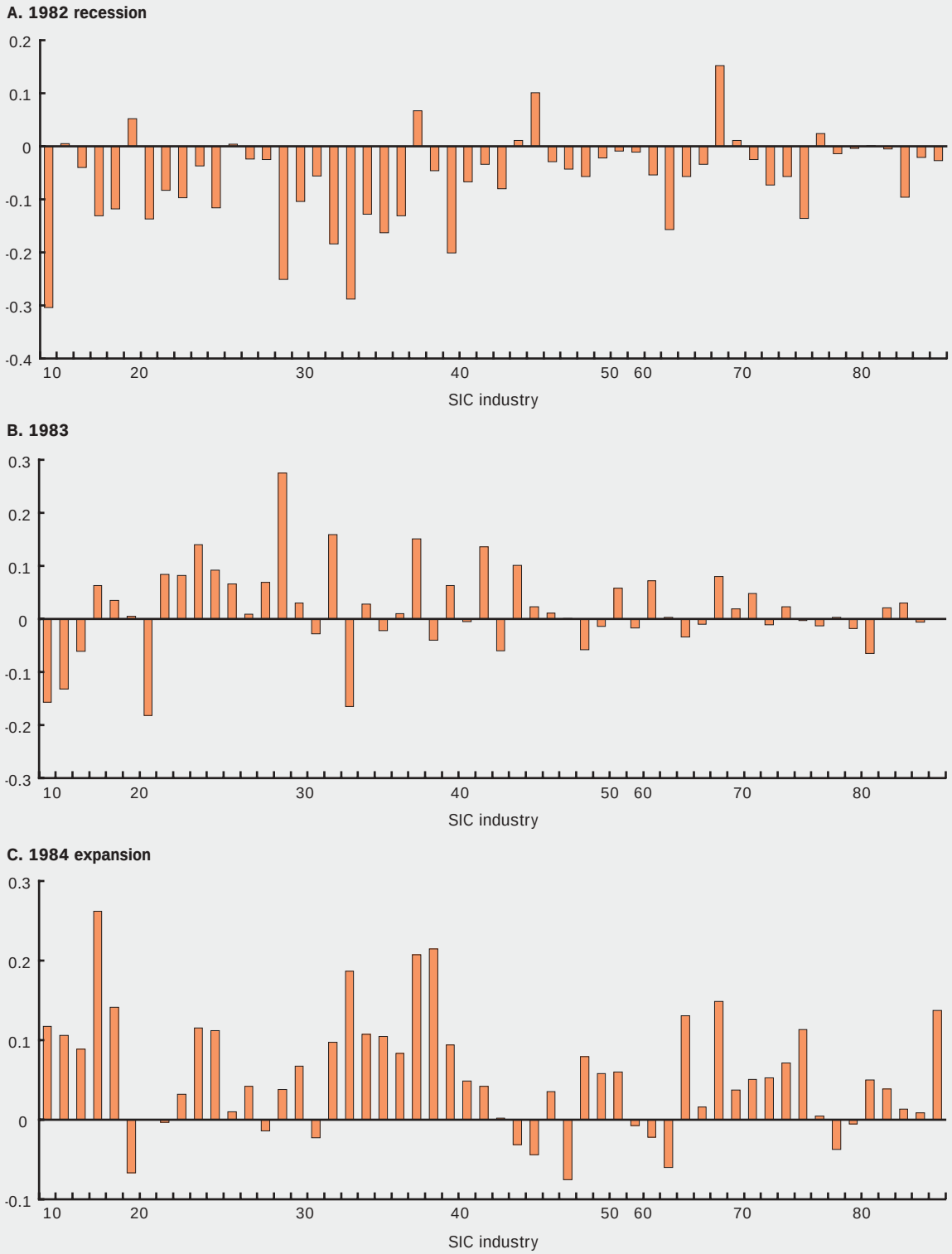
Using the volatility measure calculated above, we examine how each component of the volatility measure is associated with the share of THS employment in each state. We proceed with the following specification:

$$5) \quad THSshare_{st} = (UVAR_{st}, CVAR_{st}, \ln non\text{-}THS\ emp_{st}, Urate_{st}, X_{st}, \text{Year dummies})\,\beta + u_{st},$$

where $THSshare_{st}$ represents the THS employment share in state *s* in year *t*, β is a vector of coefficients, and u_{st} is a random component. In the regression, we control for the size of the labor market in each state by including the size of non-THS employment (*non-THS emp*) in logarithm. In a larger labor market, each THS agency may have a longer list of workers seeking temporary work. This might facilitate scale economies for THS agencies in their searching process and allow them to provide their services more efficiently; this in turn might increase the use of THS. We also control for the state's unemployment rate (*Urate*); a higher unemployment rate might reduce employment opportunities for temporary workers more than for permanent workers and might in turn influence the THS employment share.

FIGURE 3

Residual growth rates of output by industry for years of recession and expansion



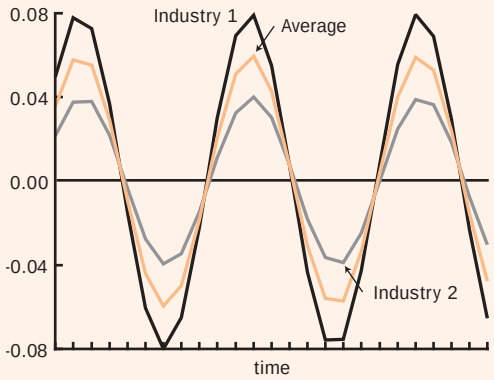
Source: Authors' calculations based on data from the U.S. Department of Commerce, Bureau of Economic Analysis.

BOX 1

An example of how the co-movement of output fluctuations affects the overall volatility

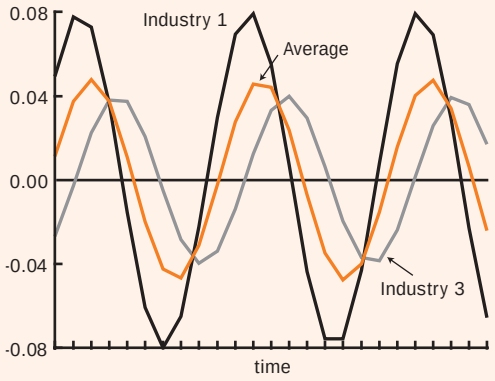
We consider the following hypothetical case for illustrative purposes. Take two states, A and B. State A's economy consists of two industries, industries 1 and 2, and they are about equal in size in state A. We assume that industry 1 is more volatile than industry 2 (the range over which the output of industry 1 fluctuates is wider), but that their output moves up and down together (co-movement). So these two industries expand and contract at approximately the same time. Figure B1 illustrates the co-movement of the (detrended) growth rates of output in industries 1 and 2. Industry 1's growth rate typically fluctuates from its trend growth rate by –8 percent to 8 percent; and industry 2's, by –4 percent to 4 percent. Since, in state A, the two industries are equal in size, the average residual growth rate in state A is simply the mean of the residual growth rates of industries 1 and 2.

Figure B1
Residual growth rate of output, state A



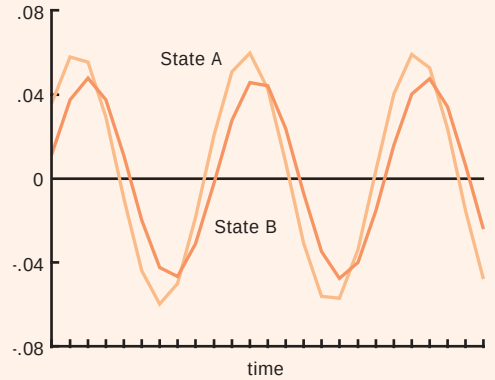
In state B, we assume that half of the economy is represented by industry 1 as in state A and the other half by another industry, industry 3. As we show in figure B2, industry 3's output is as volatile as that of industry 2—industry 3's growth rate deviates from its trend by almost the same degree as that of industry 2. However, unlike industry 2, industry 3's output fluctuation does not coincide with that of industry 1. In state A, the correlation of residual growth rates between industries 1 and 2 is very close to 1. However, in state B, the correlation between residual growth

Figure B2
Residual growth rate of output, state B



rates of industries 1 and 3 is about 0.1. Because of the relatively low degree of co-movement of output fluctuations in industries 1 and 3, on average the output is less volatile in state B than in state A. In figure B3, we plot the average of the residual growth rates in states A and B. The average residual growth rate in state A ranges between –6 percent and 6 percent, and that in state B ranges between –4.5 percent and 4.5 percent. So the co-movement of output fluctuations between industries and industrial composition matter for the overall volatility in each state.

Figure B3
Comparison between states A and B



We control for factors that may influence the supply of THS workers by including the demographic characteristics of each state (share of population by age, sex, and race). We also include year dummies to control for the increase in THS share that every state has experienced. After controlling for these variables, we expect the coefficient of *UVAR* to be positive and that of *CVAR* to be negative, since as we discussed before, greater volatility would increase the demand for temporary workers, while greater correlation of output

TABLE 1

States with highest and lowest volatility

	VAR	UVAR	CVAR
Five states with highest volatility			
Indiana	.000760	.000144	.000616
Michigan	.000757	.000168	.000589
Connecticut	.000700	.000153	.000547
Ohio	.000695	.000136	.000559
New Hampshire	.000692	.000158	.000534
	VAR	**UVAR**	**CVAR**
Five states with lowest volatility			
Alaska	.000433	.000163	.000270
South Dakota	.000430	.000137	.000293
Hawaii	.000427	.000143	.000284
North Dakota	.000386	.000139	.000247
District of Columbia	.000231	.000093	.000138

Notes: VAR is overall volatility; UVAR is uncorrelated output variance; and CVAR is co-movement variance.
Source: Authors' calculations based on data from the U.S. Department of Commerce, Bureau of the Census, *County Business Patterns* and the U.S. Department of Commerce, Bureau of Economic Analysis.

fluctuations among industries may shift down the supply curve of temporary workers and lower the use of temporary workers.

The data on employment for the THS and non-THS sectors are taken from *County Business Patterns* (CBP) 1977–97.[5] The CBP reports are published by the U.S. Department of Commerce, Bureau of the Census and provide county- as well as state-level industry data, based on the four-digit Standard Industrial Classification (SIC) codes. We use state unemployment time-series data from the BEA. In addition, we use the Census population data and the *Current Population Survey* (CPS) for the demographic profiles of each state from 1977 to 1997. In particular, we calculate the shares of population in different age groups and the shares of female and black population in each state and each year and include them in our regression.

Table 2 shows the summary statistics of the dependent variable and covariates of 50 states and the District of Columbia. On average, THS employment made up 0.98 percent of state employment between 1977 and 1997.[6] Within the same period, each state, on average, had about 1.6 million people employed in the non-THS private sector and an unemployment rate of 6.4 percent. Between 1977 and 1997, the share of people under 17 years of age averaged about 27.2 percent in each state; the share of people aged 18 to 24, 11.5 percent; the share of people aged 25 to 64, 49.1 percent; and the share of those aged 65 and over, 11.9 percent.

According to the CBP data, there is a lot of variation in THS employment across different states. Table 3 shows the top five and bottom five states in terms of the average THS employment shares from 1977 to 1997. On average, in Florida, THS employment represented about 2 percent of total state employment, while in North Dakota it was only about 0.2 percent. Figure 4, panels A and B show cross-sectional variation in THS employment shares in 1977 and 1997. While the increase in the THS employment share is a nationwide phenomenon, the growth of THS employment seems to vary across the U.S. For example, Arkansas, Oregon, and Utah have some of

TABLE 2

Summary statistics

Variable	Mean	Standard deviation
THS employment share	.00983	.00792
Covariates		
Employment of non-THS sectors	1,601,183	1,775,804
Unemployment rate (share)	.0644	.0209
Volatility measure		
Overall volatility (VAR)	.000562	.000113
Uncorrelated output variance (UVAR)	.000136	.000025
Co-movement variance (CVAR)	.000426	.000105
Demographic variables: Share of state population		
Age under 17	.272	.028
Age 18 to 24	.115	.017
Age 25 to 64	.491	.028
Age 65 or more	.119	.022
Female	.512	.010
Black	.105	.124

Notes: THS is temporary help service; VAR is overall volatility; UVAR is uncorrelated output variance; and CVAR is co-movement variance.
Source: Authors' calculations based on data from Haver Analytics, from the U.S. Department of Commerce, Bureau of the Census, *County Business Patterns*, *Current Population Survey*, and population census, and from the U.S. Department of Commerce, Bureau of Economic Analysis.

the nation's fastest growing THS sectors, while other states such as New York and Washington have shown more modest rates of increase. (We also compared the THS employment shares between 1987 and 1988 and found that the relative levels of THS employment shares across the states are very similar between these two years, which suggests that the 1987 SIC change is not likely to be an important factor in producing the differences in panels A and B.) The comparison between panels A and B in figure 4 reveals that the regional composition of temporary employment might have shifted away from the North East toward the South West over the 20-year period we study. In the next section, we examine how the cross-sectional differences in THS employment shares are related to output volatility at state level.

TABLE 3

THS employment share, average 1977–97

U.S.	.983 (%)
Top five states	
Florida	2.011
Arizona	1.582
California	1.563
Texas	1.511
District of Columbia	1.461
Bottom five states	
Alaska	.360
Montana	.325
Wyoming	.323
South Dakota	.321
North Dakota	.198

Note: THS is temporary help service.
Source: Authors' calculations based on data from the U.S. Department of Commerce, Bureau of the Census, *County Business Patterns*.

Results

In this section, we discuss the results from our regression analysis.[7] In column 1 of table 4, we consider the effects of both *UVAR* and *CVAR* on the shares of temporary employment across the states. We find that the coefficient for *UVAR* is positive and that of *CVAR* is negative, which is consistent with our hypothesis outlined above. Both coefficients are significant. The empirical findings do not change qualitatively when we allow the effect of each demographic component to vary over time (regression in column 2).

The positive coefficient for *UVAR* suggests that there may be greater demand for temporary labor in states with a mix of volatile industries. It is possible that volatility of output among industries in these states creates more business opportunities for THS agencies, which might attract more agencies to the local market and enhance competition among them. As a result of greater competition, the price charged to client firms is likely to fall, which in turn may increase the use of THS.

However, the negative coefficient for *CVAR* indicates that, for a given level of *UVAR*, THS employment shares are lower if output fluctuations tend to coincide across industries. These results intuitively make sense. First, if output fluctuations are highly correlated among industries, decisions to hire and fire temporary workers are more likely to be correlated among industries as well. In such a case, the demand for temporary workers that each THS agency faces will become more volatile. As a result, THS agencies might find it more costly to provide a matching service in a timely manner. The increase in the costs of matching may be reflected in higher prices charged to client firms, making the use of temporary labor less attractive. Second, the co-movement of output fluctuations might also reduce the supply of temporary labor. If all industries decide to reduce their use of temporary workers simultaneously as a result of a common shock to production, THS agencies will find it difficult to place their workers. Thus, temporary workers might face a higher risk of not being able to secure an alternative assignment once the current assignment ends. This might make temporary work less attractive, leading to a lower supply of temporary labor and a lower quality of services offered by THS agencies. As a result, client firms might use THS services less intensively.

Finally, depending on the sample, in some cases the effect of *CVAR* may dominate the effect of *UVAR*, which may result in a negative correlation between overall volatility and THS employment share. In our sample, as shown in the regression in column 3 of table 4, on average, the positive effects of *UVAR* and the negative effects of *CVAR* seem to offset each other; the effects of overall volatility (*VAR*) on temporary service employment appear to be insignificant at the 10 percent level.

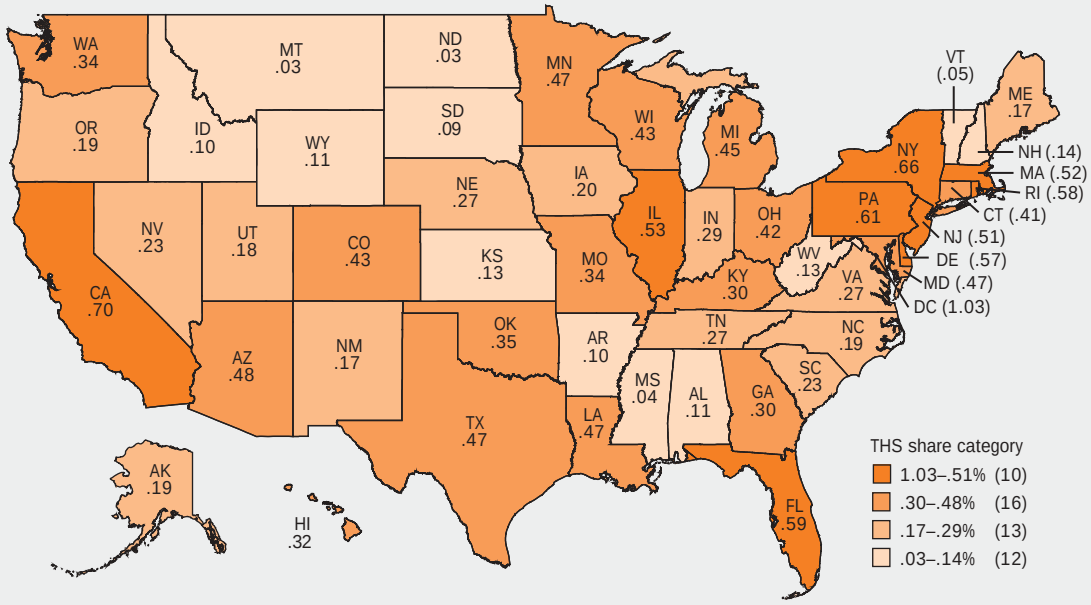
Effects of other variables

In addition to volatility, we examine the effects of unemployment and demographic variables on THS employment share across the U.S. The unemployment rate appears to be negatively related to THS employment share. This may be connected to the fact that temporary workers may be used as buffers—a decrease in the use of temporary workers during a downturn would contribute to a higher unemployment rate. The result is also consistent with Otto (1999), who finds that the share of temporary employment reduces the natural rate of unemployment in local labor markets.

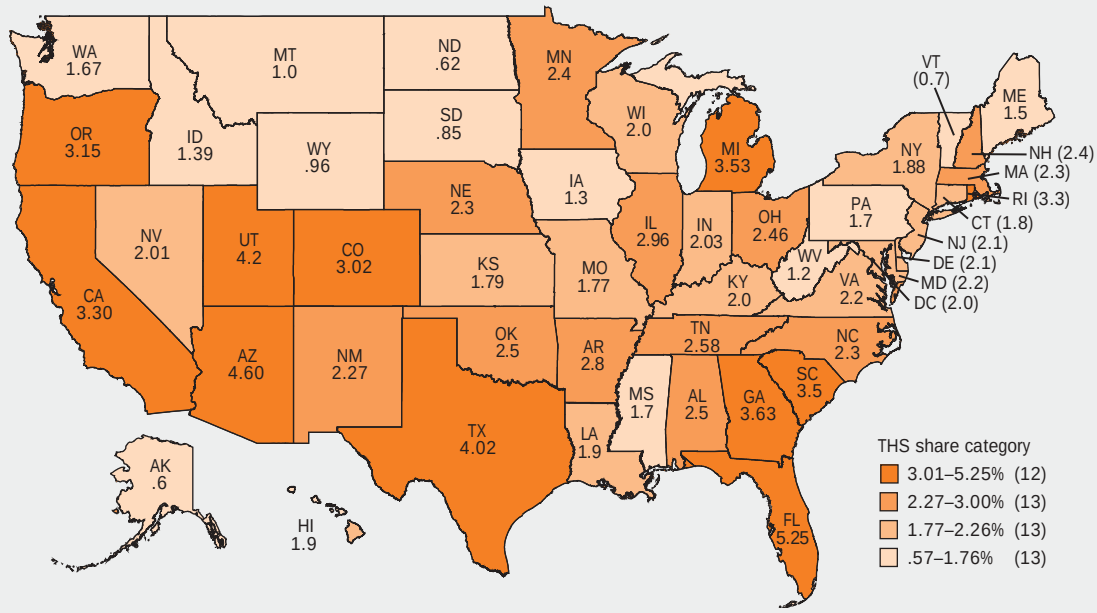
FIGURE 4

THS employment percentage of total state employment

A. 1977



B. 1997



Source: Authors' calculations based on data from the U.S. Department of Commerce, Bureau of the Census, *County Business Patterns*.

In addition, we find that state demographic characteristics appear to have an effect on the supply of temporary workers. In particular, large shares of THS employment are positively associated with higher shares of female, black, and 18–24 year old population groups. This result is consistent with other studies that analyze the demographic composition of the temporary work force (Polivka, 1996, and Cohany, 1998).

It is also interesting to see how the effects of demographic factors change over time between 1977 and 1997. In particular, in regression 2 in table 4, the coefficient for the interaction term between black population share and time (*Black* × *T*) turns out to be positive and significant, suggesting that more black workers were involved in temporary work in 1997 than in 1977. In addition, we find that the interaction term between the percentage of children (that is, share of population under age 17) and time obtains a positive and significant coefficient, suggesting that households with children were more likely to be involved in temporary labor in 1997 than in 1977.[8]

TABLE 4

Effect of volatility measure

	(Dependent variable: THS employment share)		
	1	**2**	**3**
UVAR	14.893***	10.772**	
	(4.980)	(2.110)	
CVAR	–2.194*	–3.081***	
	(1.218)	(1.190)	
VAR			–.146
			(1.059)
Control variables			
Log employment of all other sectors	.00191***	.00189***	.00171***
	(.000115)	(.000111)	(.000103)
Unemployment rate	–.0254***	–.0238***	–.0247***
	(.00554)	(.00541)	(.00556)
Demographic characteristics, share of state population			
Age 17 and under	–.0320***	–.0587***	–.0338***
	(.00484)	(.00951)	(.00483)
Age under 17 × T		.00397***	
		(.000887)	
Age 18 to 24	.0391***	.0740***	.0334**
	(.0135)	(.0253)	(.0134)
Age 18 to 24 × T		.000280	
		(.00203)	
Age 65+	–.0378***	–.0157	–.0389***
	(.00716)	(.0116)	(.00719)
Age 65+ × T		–.00423***	
		(.000913)	
Female	.0482***	.0548***	.0311**
	(.0168)	(.0171)	(.0159)
Female × T		.000125	
		(.0000853)	
Black	.00323**	–.00329*	.00317***
	(.00113)	(.00179)	(.00113)
Black × T		.000660***	
		(.000152)	

Notes: THS is temporary help services; VAR is overall volatility; UVAR is uncorrelated output variance; and CVAR is co-movement variance. Year dummies are included in the regression. T = (Year–1977). Standard errors are in parentheses. * Indicates significant at 10 percent level; ** indicates significant at 5 percent level; and *** indicates significant at 1 percent level.

Source: Authors' calculations based on data from Haver Analytics, from the U.S. Department of Commerce, Bureau of the Census, *County Business Patterns*, *Current Population Survey*, and population census, and from the U.S. Department of Commerce, Bureau of Economic Analysis.

Conclusion

Many researchers have argued that the presence of the THS industry enhances flexibility in labor markets by allowing firms to accommodate cyclical fluctuations in output demand more efficiently. In this article, we analyze the relationship between output volatility and the use of temporary workers across the U.S. between 1977 and 1997. We find evidence that all other things being equal, the THS share of employment is higher in states with more volatile industries. However, we also find that in a state with a relatively high degree of co-movement of industry output fluctuations, the use of temporary workers is lower, suggesting a reduced ability of THS agencies to enhance labor market flexibility in these states. Our finding suggests that THS agencies can operate more efficiently as an intermediary between client firms and workers in an environment in which industry output fluctuations do not coincide.

NOTES

[1]Under the Employee Retirement Income and Security Act, for a firm to receive a tax deduction on its contributions to its employee pension plan, the plan must cover at least 70 percent of non-highly compensated employees who worked 1,000 hours or more over the previous 12 months. Thus, many temporary workers may be excluded even if they work on a full-time basis (Houseman, 2001b).

[2]To accommodate to the data available from the BEA, based on the two-digit Standard Industrial Classification (SIC) system, we categorize SIC industries into 54 categories: 19 manufacturing industries, 13 service industries, eight transport and public utility industries, six finance and insurance industries, four mining industries, and one each for the construction, wholesale, retail trade, and agriculture industries. We excluded the agricultural industry in calculating the index. Statistics cited in Cohany (1998) indicate that THS agencies do not typically serve that industry.

[3]Note that we calculate the output volatility of each industry at national level instead of state level. This is because the state-level volatility of an industry might be influenced by the amount of THS services available in the state; this may not be appropriate to examine the role of the THS industry in facilitating the flexibility of volatile industries. For example, in a state where THS services are not readily available, firms may have to operate with low levels of temporary workers in their labor force. Without the flexibility of adjusting their labor force, some firms may find it difficult to survive, leaving only stable firms in the state. As a result, the industry output will be less volatile in the state with a lower THS industry share, which will contribute to the positive correlation between the volatility level and the THS industry share across states. The volatility will be relatively greater in a state with a higher THS industry share, not because the THS industry meets the needs of the firms with volatile output, but because the firms could not survive in other states with lower THS shares. By measuring an industry's volatility at national level, we alleviate this problem to the extent that industry composition is determined exogenously.

[4]THS industry share is not included in the calculation of volatility index.

[5]In the CBP, before 1987 the SIC code for the THS sector is 7362; after 1987, it is SIC7363. The 1987 revision to the Standard Industrial Classification System (SIC) expanded the Temporary Help Supply Services industry (7362) to a slightly broader aggregate, Personnel Supply Services (7363). To the degree that this expansion is proportional across states, it is absorbed by year effects. We acknowledge the Center for Governmental Studies at Northern Illinois University for providing the CBP with supplemented data.

[6]While the CBP data do not distinguish between temporary and permanent employees of THS establishments, the overwhelming majority of THS employees are temporary workers. For example, Manpower Inc. has approximately 22,400 staff employees (1.2 percent of its total work force), who oversaw the placement of 1.9 million temporary workers in 2001. (These numbers are based on data available at www.manpower.com/mpcom/index.jsp.)

[7]Results presented here are from robust regressions as suggested by Li (1985). This method takes account of the effects of outliers by giving them a smaller weight.

[8]We also performed regressions including a variable that measures the rate of inter-state migration, since it is possible that newly arrived residents may be more likely to enter the temporary labor force. The migration measure is based on the share of respondents in the CPS datasets that indicated they lived in a different state a year prior to their interview. The variable is only available from 1982 to 1997, so we run the regressions for that limited period. We found that the share of recently migrated population was positively associated with the level of THS employment, while our key results regarding the volatility index remained qualitatively the same.

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