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THE DETERMINANTS OF EMPLOYMENT CREATION IN SMALL REGIONAL FIRMS

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This article examines the determinants of employment creation in small regional firms. A number of factors are considered that account for the external and internal environment of the firm. A simple theoretical model of employment creation is developed where the determinants of a firm's employment are the volume of production, the capital of the firm, and the uncertainty of the demand as evaluated by the individual entrepreneur. Employment is found to be positively related to sales, the amount of required paperwork, the application of new production processes, and the openness of the establishment to new ideas. There is no significant qualitative difference in results when a distinction is made between male and female workers. However, in terms of the magnitude of results, female employment is more difficult to account for (lower coefficient of determination), and firms employing females are more likely to be innovative.

Keywords: *employment; small firms; Greece*

The purpose of this article is to examine the determinants of the employment decisions of small (entrepreneurial) firms in a typical region of Greece (Aitolokarania). An entrepreneurial firm is one that an individual starts up and then manages on a day-to-day basis, maintaining control of it and enjoying any excess profits accruing from it. Furthermore, an entrepreneurial firm is unique in terms of its organizational structure, market strategy, and subjective assessment of the uncertainty characterizing its business environment. The firms are very important for employment creation, particularly in (small) regions characterized by labor immobility and very few alternative employment opportunities. This article attempts to contribute to three very important streams of empirical and policy-oriented literature.

First, a growing body of empirical literature has sought to analyze the effects of the process of European economic integration on employment levels at a regional level. For example, Brunello, Lupi, and Ordine (1998); Epifani (1999); and Redding and Vera-Martin (2001) found that in part because of a lack of factor mobility, economic integration has brought about an increase in the level of

regional unemployment divergence and a connected rise in aggregate unemployment levels in the European Union (EU). This has obvious economic policy implications to which this study attempts to make a contribution. The most important regional implication is the divergence of per capita regional income. Since its inception in 1957, one of the main objectives of the EU has been the development of its lagging regions, primarily by attempting to increase employment levels. In fact, the Single European Act of 1987 was explicitly aimed at reducing regional disparities by supporting regional job creation (European Commission 1995, 1998). A report released by the Regional Policy Branch of the European Commission in 1995 reinstated its commitment to regional development. According to this report, a drive toward regional economic convergence was necessary, because empirical evidence has shown that not all regions have reaped the benefits of economic development. This has inspired a number of empirical studies that have sought to examine regional economic convergence. Neven and Gouyette (1995) reported that since 1975, there has been a process of convergence among 107 EU regions, which is contrary to what Bacchetta (1993) found using data from 35 EU regions. On the other hand, Cheshire and Carbonaro (1995) found mixed evidence using different model specifications for 122 urban EU regions. One drawback of these studies, relative to this study, is that they make cross-country comparisons and do not use sufficiently disaggregated (truly regional) data. Lucas (1988, 4) has suggested that “within-country income comparisons are easier to draw than across-country comparisons.” It is very important that any analysis of regional employment creation and, therefore, regional development must use data for an entity that can be defined as a region from both an economic and administrative standpoint. The lack of such disaggregated data make the conclusions of these studies irrelevant for regional policy within the EU.

This study uses data gathered from entrepreneurial firms in the region of Aitolokarnania in Greece, which is a poor region by the standards of the EU but a typical Greek region in both population size (223,285) and GDP per capita of 2.5 million drachmas, in 1991, compared to an average of 1 million drachmas. Results of this study will be of interest to European economic policy makers, because knowledge of factors, which increase employment in the entrepreneurial firms, will provide a platform for policies designed to alleviate the problem of regional disparities.

Second, the important role played by private enterprises in the process of job creation is now widely acknowledged by economists. For example, Pfeffermann (2001), in his work for the International Monetary Fund, stressed the important role played by competitive entrepreneurial firms in creating sustainable increases in long-term employment. By analyzing the effect of variables significant in the employment decisions of private enterprises, this study will contribute to an understanding of how these firms make their employment decisions, thus providing invaluable information regarding the measures necessary to encourage the growth of a region’s entrepreneurial environment. Within this context, this study was also

motivated by work carried out by Caballero et al. (1997), which, using data from a large sample of U.S. manufacturing firms, showed that fluctuations in aggregate employment are not only dependent on aggregate shocks but also on microeconomic adjustments occurring at the firm level. The study concluded that “microeconomic heterogeneity is important not only for microeconomic issues, but also for macroeconomics,” and continued by saying that “knowing the location of clusters of firms in state space matters for understanding the average response of firms to aggregate shocks” (p. 133). Similarly, Ichniowski, Shaw, and Prennushi (1997) presented empirical evidence of the impact of employment practices on productivity by examining the steel-finishing processes in the United States. They found that a more entrepreneurial environment within the workplace is associated with higher labor productivity. There are important similarities between this study and theirs, because they used a unique set of data gathered through personal visits to the respective firms to examine employment practices. However, their study looks at workers’ performance under alternative human resource management practices, while the focus of this study is the determinants of employment at the firm level within a small regional environment.

In addition, the Ichniowski, Shaw, and Prennushi (1997) study is restricted to one specific production process, making very difficult any generalization at the interindustry level. In this study, a different research strategy is followed: looking at a survey of a representative sample of a cross-section of firms to determine how the heterogeneity of entrepreneurial firms affects the level of labor productivity and, therefore, the level of employment. This approach is not without limitations. Black and Lynch (2000) have argued that many studies found a significant correlation between human resource management systems and business performance. The latter includes the productivity of labor.

The heterogeneity of entrepreneurial firms relates to another stream of literature that attempts to apply trade models to regional issues. The new economic geography emphasizes the existence of monopolistic or oligopolistic competition as the cause of trade and location. The pioneer work of Krugman (1979) has imputed industrial organization elements into the traditional international trade theory. As Neary (2001) has noted, scale differences among firms can be explained, either by differences in technology (innovativeness) or by differences in the pattern of demand. Both of these factors are included in this article as determinants of employment in a regional context with international trade.

The heterogeneity of entrepreneurs in coping with their uncertain environment is also demonstrated by their ability to cope with the red tape, government regulation and tax compliance. Entrepreneurs are forced to cope either by devoting their time or hiring additional staff to deal with government-related bureaucracy. This increase in employment adds in a nonproductive way to the cost of doing business, undermining the competitiveness and therefore the long-run sustainability of small firms. A number of recent studies for the United Kingdom and the United States have demonstrated the impact of government paperwork on cost and employment;

see Carter et al. (2002) and Crain and Hopkins (2001). This study contributes to this literature by explicitly modeling the impact of paperwork on employment.

Finally, this study contributes to literature that examines the determinants of the size of the firm. Glancey and Goddard (1996), in a similar study, have used the number of employees as a measure of firm size. Lucas (1978) has argued that entrepreneurial firms are limited in their size because of the inability of individual entrepreneurs (he equates them with managers) to expand their firms. It is important to understand what the determinants of this inability are.

This article is divided into five sections. The next section develops the theoretical framework for empirical purposes. The third examines the source, definitions, and summary statistics of both the dependent and explanatory variables. The fourth presents the results of the regression analysis of the three following equations: total employment, male employment, and female employment. The final section provides conclusions and discusses some of the implications of the empirical results.

THE THEORETICAL BACKGROUND

The entrepreneur is assumed to supply a market facing the following demand curve:

$$Q^d = \theta P^{-\varepsilon} \quad \theta > 0, \quad (1)$$

where Q represents the units of output, P denotes price, ε is the price elasticity of demand, and θ is a random shift parameter of demand that determines the position of the demand curve. Its probability density function is common knowledge, but only the individual entrepreneur observes its realized value. θ depends on the ability of the individual entrepreneur to estimate the variability of the demand curve and also a number of variables that describe the internal organization of the entrepreneurial firm. Examples are formality, innovation, and the type of decision making, and they can be used to account for the firm's specific characteristics that affect this parameter (θ).

The entrepreneur combines labor (L) and capital (K) to produce Q units of output per unit of time, using a constant returns to scale production function, which, for simplicity, is assumed of the Cobb-Douglas form:

$$Q^s = AL^\alpha K^{1-\alpha} \quad 0 < \alpha < 1, \quad (2)$$

where A is a measure of total factor productivity. For simplicity, it is assumed that the capital investment $K > 0$ must be made in the beginning of the operation. Capital is sector specific and nonrecoverable, and the capital stock can be defined to include human capital characteristics of the individual firm, such as the "culture" of the organization.¹

Labor is supplied to the entrepreneur according to the following labor supply function:

$$L^s = (W/P)^\gamma \quad \gamma < 1, \quad (3)$$

where W is nominal wages and γ is the real wage elasticity of labor supply.

Finally, two equilibrium conditions must hold: labor supply must be equal to labor demand, and the firm's supply of output must be equal to the demand for it.

$$L^s = L^d = L^* \quad (4)$$

and

$$Q^s = Q^d = Q^*. \quad (5)$$

It is now assumed that the entrepreneurial firm maximizes the following profit function, choosing labor and capital:

$$\max \pi = PAL^\alpha K^{1-\alpha} - WL - RK, \quad (6)$$

where RK is the sunk cost of capital. It is also assumed that all elements of K that can be described as "culture" are firm specific and therefore nonrecoverable. R , then, represents the shadow price of all these elements.

The first-order condition for maximization gives the following labor demand curve:

$$L^d = [\alpha/(1-\alpha)](R/W)K. \quad (7)$$

Using equations 7, 4, and 3, the following wage function is obtained:

$$W = [\alpha/(1-\alpha)]^{1/(1+\gamma)} R^{1/(1+\gamma)} K^{1/(1+\gamma)} P^{\gamma/(1+\gamma)}. \quad (8)$$

Substituting equation 8 into equation 3 and rearranging gives

$$L^* = [\alpha/(1-\alpha)]^{\gamma/(1+\gamma)} R^{\gamma/(1+\gamma)} K^{\gamma/(1+\gamma)} P^{-\gamma^2/(1+\gamma)}. \quad (9)$$

The employment function can then be obtained by substituting P from equation 1.

$$L^* = [\alpha/(1-\alpha)]^{\gamma/(1+\gamma)} R^{\gamma/(1+\gamma)} K^{\gamma/(1+\gamma)} \theta^{-\gamma^2/\epsilon(1+\gamma)} Q^{\gamma^2/\epsilon(1+\gamma)}. \quad (10)$$

For empirical purposes, the above equation becomes

$$\ln L^* = \beta_0 + \beta_1 \ln K + \beta_2 \ln \theta + \beta_3 \ln Q, \quad 0 < \beta_1 < 1, \beta_2 < 0, \text{ and } \beta_3 > 0. \quad (11)$$

The above equation states that employment depends on capital, demand uncertainty, and the volume of production. The effect of the demand uncertainty variable θ is negative. The variable K includes both physical capital and other human capital and organization-related characteristics of the entrepreneurial firm. The entrepreneurial capacity can be interpreted as human capital that is possessed by certain individuals. In this sense, this idea has been developed by Hayek (1945), Coase (1937, 1960), Lucas (1978), and Baumol (1990). See also Kirzner (1997) for a review of Hayek's approach to entrepreneurial process. For a human capital approach to entrepreneurial capacity, see Otani (1996). The internal organization of the firm and its relation to performance is examined, among others, by Dollinger and Golden (1992), Fraja (1996), and Russell and Russell (1992). The measurements of these characteristics are discussed in the next section. Finally, the effect of the volume of production (Q) on employment is positive.

DATA

The sample consists of entrepreneurial firms from the region of Aitolokarania, which is located in the central western part of Greece.² The statistical population consisted of forty-four firms and was listed in the regional chamber of exporting companies. One firm was dropped because it was the subsidiary of a large multinational enterprise. This approach excluded only small village cafes, as they operate independently from the external environment that affects other firms in the area. Even though this might be considered a shortcoming, a number of studies have shown that small regional firms have an outward-looking strategy. Julien (1996) asserted that 85 percent of small firms engage in some sort of international trade. Westhead et al. (2001) examined the impact of the internal and external environmental factors influencing the exporting strategies of the small firms. They used a U.K. sample of small firms in the manufacturing and service sector. Among other things, they found that employment growth, the focus of this study, was highly skewed toward a small number of both exporting and nonexporting firms.

In this study, a questionnaire was used as an instrument, and the owner of the firm was personally interviewed to collect the data. These interviews were conducted between May and September of 1997. Starbuck and Mezias (1996) discussed the limitations of this method, which primarily have to do with the subjectivity of the answers and the selection bias of personal interviews. Bertrand and Mullainathan (2001) summarized the literature on experimental and empirical work. They suggested that subjective data in an econometric framework should not be used as dependent variables, but they might be useful as explanatory variables.

In this study, the dependent variable, number of employed persons, is objectively measured. They concluded that the use of subjective data as explanatory variables is appropriate for explaining differences in behavior across individuals. This is exactly the treatment of these variables in this study.

In the context of this study, those small entrepreneurs that agreed to participate in the interview might have had different characteristics from those that did not. For example, the probability that an innovative firm will agree to participate in the interview process might be higher than the respective probability in the case of a noninnovative firm. This will bias the results in favor of innovativeness. On the other hand, those that are innovative might have less time available to devote to an interview process, revealing the high opportunity cost of time. Even though it is difficult to document, when attempting to follow up to those firms that did not respond to the questionnaire, it became clear that the main reason for nonparticipation was a lack of time. However, the use of personal interviews has the advantage of collecting unique data at the firm level.

In total, twenty-four firms responded to the questionnaire, representing 56 percent of the firms under investigation. The questionnaire was divided into six parts. Part one included questions related to firm-specific characteristics: the sector,³ the number of people employed, the date of establishment, total sales, and the legal form of the company. The other parts of the questionnaire consisted of questions that aimed at finding out the subjective views and practices of the entrepreneurial firms concerning the process of decision making, the bureaucracy, the intrafirm behavior, the significance of innovation, and the uncertainty of the demand environment.

Table 1 shows the summary statistics of the three dependent variables of the empirical model: total employment, male employment, and female employment. The average total employment was twenty-nine people, twenty-three males and six females. The largest firm employed one hundred people, but as is demonstrated by the low value of the median, there were many firms employing below this simple arithmetic mean. Almost 60 percent of the firms employed fewer than twenty people (not reported in the table). The firms employing fewer than ten male workers accounted for 50 percent of the total sample, and 83 percent of the firms employed fewer than ten female workers. This, however, is the typical entrepreneurial firm, with low levels of employment and long hours of work by the entrepreneur.

The highest moments of the distribution, skewness and kurtosis, demonstrate that the distribution of employment is positively skewed, particularly the female employment distribution. On the other hand, the Jarque-Bera test for normality rejects the hypothesis of a normal distribution.

The summary statistics of the explanatory variables used in the regression analysis are reported in Table 2. Sales are measured in millions of drachmae. The average revenue was close to 1 billion drachmae, but 70 percent of the firms had sales less than that, which is also demonstrated by the low value of the median of 750 million.

TABLE 1. Summary Statistics of Dependent Variables

	<i>Total Employment (EMPLT)</i>	<i>Male Employment (EMPLM)</i>	<i>Female Employment (EMPLF)</i>
Mean	29.0	22.7	6.4
Median	16.5	11.5	2.0
Maximum	100.0	80.0	60.0
Minimum	2.0	2.0	0.0
Standard deviation	29.5	22.4	12.8
Skewness	1.3	1.3	3.25
Kurtosis	3.3	3.5	13.6
Jarque-Bera (probability)	6.8 (.03)	6.7 (0.03)	153.9 (0.00)
Number of observations = 24			

The low revenue figures demonstrate the small size of the firms analyzed in the study. Firms were classified into four sectors: primary, manufacturing, commerce, and other services. Three firms, 12.5 percent, were from the primary sector; nine firms, 37.5 percent, were from the manufacturing sector; seven firms, 29 percent, were from the commercial sector; and five firms, 21 percent, were from other service sectors.

The year of establishment is the next variable shown in Table 2. The oldest firm was established in 1951 and the most recent one in 1995. Half of the companies were established after 1980. The average age of establishment was twenty years.

In economic terms, all companies were sole proprietorships (operated by the owner), but in legal terms, thirteen companies, 54 percent, were limited liability companies and were assigned a value of one. There were eight companies, or 33 percent of the total, that were registered as a sole proprietorship, and they were assigned a value of four. Also, one company was registered as a partnership of limited liability, and two companies were total liability companies and were assigned the values of two and three respectively.

The next four variables measure the subjective evaluation of entrepreneurs, concerning their level of bureaucracy (paperwork), their receptiveness to new ideas, their application of innovative production activities, and the uncertainty of demand that they face. The results showed that the entrepreneurs devoted 32.5 percent of their time doing paperwork, primarily work that had to do with their relations with the government, particularly tax authorities. Five percent of companies reported that they devoted more than 50 percent of their time to paperwork, while 66 percent of the firms spent less than 30 percent of their time on paperwork. Similar numbers have been obtained from recent surveys of small firms in the United States and the United Kingdom. According to the U.S. Small Business Administration, reported by Jones (2002), an entrepreneur spends between 7 and 25 percent of his or her time on red tape, tax compliance and other government-related paperwork. In a similar study for the United Kingdom, commissioned by the Federation of Small

TABLE 2. Summary Statistics of Explanatory Variables

	<i>Sales</i>	<i>Sector</i>	<i>Year</i>	<i>Company</i>	<i>Paperwork</i>	<i>Receptiveness</i>	<i>Innovation</i>	<i>Uncertainty</i>
Mean	981	2.6	1978	2.2	32.5	5.6	5	3.1
Median	750	2.5	1981	1	30	6	5	3.5
Maximum	3,200	4	1995	4	90	7	6	6
Minimum	48	1	1951	1	10	1	2	1
Standard deviation	1,009	0.97	13	1.4	23	1.9	1.1	1.8
Skewness	1.1	0.05	-0.7	0.4	0.8	-1.2	-0.74	0.08
Kurtosis	2.7	1.94	2.1	1.2	2.7	3.0	3	1.4
Jarque-Bera (probability)	4.7 (.09)	1.1 (.57)	2.5 (.3)	3.8 (.15)	2.5 (.3)	5.6 (.06)	2.2 (.3)	2.4 (.3)
Number of observations = 24								

Businesses (FSB) and reported by Knight (2002), it was estimated that the average entrepreneur spends 20 hours a week dealing with red tape. As will be shown below, this poses an important cost on all business, but it is much larger for small enterprises.

On a scale from 1 to 7, the entrepreneurs would not express their skepticism concerning new ideas before they have been seriously evaluated in terms of their contribution to the firm's performance, but the average entrepreneurial firm was very receptive, with an average of 5.6 and a median of 6. The results are similar for the application of innovative production processes. On a scale of 1 to 6, the average value was 5, and ten firms (or 42 percent) gained a value of 6.

The last variable is a direct subjective measurement of the uncertainty of firms' demand. On a scale of 1 to 6, from *very stable* to *very unstable* demand, the average score was 3.1. The uncertainty of the demand is a normal curve, with twelve firms considering their demand as varying while the other twelve believe their demand to be stable. This is also demonstrated by the low value of the Jarque-Bera test for normality, reported in Table 2.

THE EMPIRICAL EVIDENCE

For empirical purposes, equation 11 was used as a prototype equation in this section. However, given the nature of the current definition of capital, which includes physical and human capital as well as other intrafirm characteristics, and the nature of the demand parameter θ , the empirical equation is extended to include a number of variables described in the previous section. Thus, an empirical specification of equation 11 takes the following form:

$$\log(\text{employment}) = F[\log(\text{sales}), \log(\text{sector}), \log(\text{year of establishment}), \log(\text{type of company}), \log(\text{paperwork}), \log(\text{receptiveness}), \log(\text{innovation}), \log(\text{uncertainty})]. \quad (12)$$

Since the measurement of these variables was described in the previous section, this section will briefly analyze the effect of each of the variables on employment. First, the variable *sales* corresponds to the theoretical variable units of production, which is expected to have a positive effect on employment.

The variable *sector* takes low values for primary and manufacturing sectors (1 and 2) and high values for commerce and other services (3 and 4). If the service sector is more labor intensive or creates more employment, then the effect of this variable is expected to be positive. However, this variable might be a good proxy for the capital stock required for each sector and, therefore, might have a negative impact on employment, since the service entrepreneurial firms require relatively less capital than the manufacturing sector.

The year of establishment can be interpreted as measuring the tradition and the intrafirm culture that has been developed over the years. This tradition is required to develop the organizational competencies that become the source of competitive advantage. The subject of linking the management of culture at the establishment level to increase the competitive advantage of the firm is analyzed by Fiol (1991) in a context that relates to the approach followed in this empirical study. According to this approach, organizational culture refers to all webs that bind individuals together at the workplace, making them more productive. Managing the development of such cultures depends on entrepreneurial ability. Once these networks have been established, the productivity of each worker increases and, therefore, employment increases as well. These increases can be attributed to external economies accruing to the individual worker but also internal to the firm. This additional benefit can be considered as a reward to the entrepreneurial talent.

The legal form of the establishment is another variable used in the regression and can be interpreted in a number of ways. First, the laws relating to the establishment of a company require a certain minimum amount of capital; therefore, this variable can be used as a proxy for the amount of capital required for establishing a business. It is expected that the more advanced the legal form of the company, the higher the required level of capital and, therefore, the higher the demand for labor. Second, the legal form of a business, in the context of the Greek and European company law, is an indicator of the required paperwork. The more advanced the legal form of the establishment, the higher the required paperwork and, therefore, the higher the labor demand.

The paperwork required to carry out everyday business activities is expected to require more hours of work and therefore more people to deal with government red tape and regulations. According to the FSB study previously mentioned (Knight 2002), U.K. businesses with fewer than twenty workers employ two individuals to share the entire paperwork burden. This poses a tremendous cost, particularly on small businesses. A recent report prepared by Crain and Hopkins (2001) for the U.S. Small Business Administration provides empirical evidence of the regulatory costs on small firms. Firms employing fewer than twenty workers face an annual cost of about \$7,000 per employee, almost 60 percent higher than that facing a firm employing more than twenty workers. This is the reason that small businesses consider government regulations as one of the most important impediments to increasing their competitiveness and improving their productivity. In a study for the U.K. small businesses, Carter et al. (2002) found that government regulations are considered, by the majority of the owners, as having a negative impact on their businesses. Less than 10 percent stated that changes in regulations had a positive impact. Also, according to the study of the FSB, U.K. business owners cited paperwork and government regulations as the number one problem they were facing in 2002.

The reason small firms carry a higher load than the larger ones is because there exist economies of scale in dealing with government-related bureaucracy. The cost of paperwork is considered as a having a large element of fixed cost, invariant with

firm size. Also, large firms are more efficient in dealing with red tape and government regulation by hiring specialized managers or outsourcing to specialized consulting firms. Small enterprises cannot afford such costs.

The impact of the receptiveness of the firm to developments in the market cannot be determined a priori on theoretical grounds. From the definition of entrepreneurship, it is assumed that the source of all new changes in the operation is the entrepreneur, and therefore, no new productive ideas can come from either the internal or external environment of the firm. The receptiveness to new ideas can be interpreted as a variable that measures the ability of the entrepreneur to judge the effect of the environmental uncertainty. In other words, it can be considered as a measure of the parameter θ . If this is the case, then the impact of this variable is negative. This is due to the theory that if a market is stable, then the owner-manager has no need to be receptive to new ideas and thus can employ people as the company requires. However, if the firm operates in a very dynamic environment, then the entrepreneur will be under pressure to learn about every change that occurs as it occurs. He or she will, therefore, be more receptive to the opinions of others. Under these assumptions, one can hypothesize that a measure of instability in the market is the degree of receptiveness of the owner-manager. Given that a high rate of instability in the market has a negative impact on employment, entrepreneurs' receptiveness has a negative impact on employment. Westhead et al. (2001), in reviewing the literature on the process of the internationalization of small firms, relate export performance to the internal characteristics of the firms, such as the motivations and attitudes of owner-managers. Given that they found no employment growth differences in exporting and nonexporting firms, the impact of such characteristics on employment cannot be determined on theoretical grounds alone.

The effect of innovation is expected to be positive, as the implementation of new productive processes requires new capital investments and, hence, increases the productivity of labor. Nickell and Nicolitsas (1996) have empirically investigated the link between innovation and investment in fixed capital and found that in most industries, innovation encourages investment in fixed capital. Thus, an increase in fixed capital raises both labor productivity and employment.

The last explanatory variable is the uncertainty of demand for the firm's output. This variable has a negative impact on the employment of labor, as is demonstrated in equation 10 of the theoretical framework.

This section reports the ordinary least squares (OLS) regression results of three equations: total employment, male employment, and female employment. Different model specifications are considered using the standard error of the estimate of each explanatory variable as the main criterion of dropping a variable. The last specification of the equation includes only variables that are statistically significant at the 10 percent level.

The estimates were no different from OLS when a procedure was used to provide consistent standard errors in the presence of heteroskedasticity. Also, no multicollinearity was detected between the explanatory variables. The relative

correlation coefficients were less than .5 in absolute terms. The problem of endogeneity between sales and employment could not be solved using an estimating technique, such as Two Stage Least Squares (TSLS), due to a lack of appropriate instruments for sales. However, one can argue that sales for the small firms of this region are “exogenous” to the choice of employment and are, thus, determined by the international and the national Greek market. First, the firms obtain the orders from international or out-of-region customers and then they decide how much labor to employ. The correlation coefficient of sales with the residuals was less than .5.

Table 3 reports the regression results of four specifications of the general employment model, while Table 4 gives two specifications of the male and female employment regression results. Specification 1, in both tables, includes all variables described in the previous section. Production is measured by sales. It has a positive effect on employment. A 10 percent increase in sales raises total employment by 2.6 percent in specification 1, but this number becomes 3.9 percent in the final specification of the equation (specification 4). The results for male and female employment regressions are similar, though the impact of the sales variable on female employment is slightly larger than the respective impact on male employment.

The sector of the entrepreneurial establishment is a firm-specific characteristic, but it is also related to labor-intensive arguments. For example, an argument has been made that the service sector uses more labor than the manufacturing sector. If this is true, then the positive sign on the coefficient of the sector variable in model 1 supports this hypothesis, but it is not statistically significant and, therefore, is dropped from the other model specifications in all three employment regressions: total, male, and female.

The more recently the company was established, the lower the demand for labor. The negative sign in model 1, in both tables, supports the view that tradition has a positive impact on employment, but it is not statistically significant.

The impact of the legal form of the company has the expected sign in the total and the male employment regressions, but it is not statistically significant and, therefore, was dropped from the final model specification. One reason, as explained above, is that this variable is correlated with the variable that measures the impact of government regulations and red tape. The coefficient of the required paperwork has the expected positive sign. If the red tape and government regulation increase by 10 percent, the small businesses face an additional cost given by an increase in employment of 7 percent. The effect on female employment is smaller, around 5 percent. The impact is robust in all specifications of the regression equations.

The measure of receptiveness has a strong negative effect. An increase in receptiveness reduces employment by almost the same percentage, with a slightly smaller impact on male employment. Innovation has the anticipated strong effect on all three equations of employment. A 10 percent increase in the introduction of new methods of production raises total employment by 16.5 percent.

TABLE 3. Total Employment Regression Results

<i>Explanatory Variable in Logs</i>	<i>Specification 1</i>	<i>Specification 2</i>	<i>Specification 3</i>	<i>Specification 4</i>
Constant	239 (1.04)	-2.33* (-1.75)	-2.09 (-1.57)	-2.86** (-2.33)
Sales	0.26* (1.93)	0.31** (2.46)	0.31** (2.41)	0.39*** (3.38)
Sector	0.47 (1.44)	0.35 (1.16)		
Year of establishment	-32 (-1.0)			
Type of company	-0.26 (-1.1)	-0.31 (-1.36)	-0.31 (-1.32)	
Paperwork	0.66*** (2.83)	0.65*** (3.55)	0.67*** (3.64)	0.7*** (3.77)
Receptiveness	-0.55 (-1.46)	-0.83*** (-2.93)	-0.87*** (-3.03)	-0.95*** (-3.35)
Innovation	1.72** (2.44)	1.52** (2.6)	1.57** (2.67)	1.65*** (2.75)
Uncertainty	-0.23 (-0.88)			
R^2	.7672	.7444	.7244	.6975
Adjusted R^2	.6441	.6543	.6478	.6338
SE of regression	.6341	.6240	.6298	.6421
Log-likelihood	-17.48	-18.6	-19.5	-20.6
F-statistic (probability)	6.2 (.001)	8.3 (.000)	9.5 (.000)	11.0 (.000)
Sample size = 24				

Note: Dependent variable: log(total employment). The reported estimations are ordinary least squared (OLS) estimates. Corrected estimates for heteroskedasticity, White and Newey-West HAC, were not significantly different. Values of the *t*-statistic are in parentheses.

*Significant at the 10 percent level. **Significant at the 5 percent level. ***Significant at the 1 percent level.

Finally, the uncertainty parameter has the expected negative impact on total and male employment but an opposite effect on female employment. In any case, this variable is not statistically significant and is dropped from further model specifications.

Overall, the variables explain almost two-thirds of the variability of total employment (63.38 percent), slightly greater than half of the variability of male employment (52.46 percent), and less than half of female employment variability (41.63 percent).

CONCLUSION

Employment creation in small regional entrepreneurial firms depends upon volume of production, capital of the firm, and the uncertainty of demand. The theoretical model developed in this article identified three basic variables as the determinants of employment: demand uncertainty, a measure of all elements of "capital," and the volume of production. Capital was defined to include a number of measures that characterize the internal organization of the firm. Data from regional entrepreneurial firms of Greece were used to empirically investigate the determinants of employment.

TABLE 4. Male and Female Employment Regression Results

<i>Explanatory Variable in Logs</i>	<i>Specification 1, Male</i>	<i>Specification 2, Male</i>	<i>Specification 1, Female</i>	<i>Specification 2, Female</i>
Constant	155 (0.62)	-2.4* (-1.80)	440 (1.43)	-3.71** (-2.2)
Sales	0.21 (1.46)	0.35* (2.79)	0.38** (2.1)	0.41** (2.57)
Sector	0.47 (1.34)		0.15 (0.35)	
Year of establishment	-21 (-0.6)		-59 (-1.45)	
Type of company	-0.32 (-1.2)		0.09 (0.29)	
Paperwork	0.48* (1.92)	0.65*** (3.21)	0.89*** (2.86)	0.46* (1.81)
Receptiveness	-0.35 (-0.87)	-0.84*** (-2.71)	-1.04* (-2.07)	-0.95** (-2.43)
Innovation	1.12 (1.49)	1.35** (2.1)	2.67*** (2.83)	1.56* (1.89)
Uncertainty	-0.41 (-1.43)		0.47 (1.33)	
R^2	.7068	.6073	.6495	.5178
Adjusted R^2	.5504	.5246	.4626	.4163
SE of regression	.6830	.7023	.8485	.8843
Log-likelihood	-19.26	-22.8	-24.47	-28.3
F-statistic (probability)	4.5 (.006)	7.3 (.001)	3.47 (.018)	5.1 (.006)
Sample size = 24				

Note: Dependent variable: log(male employment) and log(1 + female employment). The reported estimations are ordinary least squared (OLS) estimates. Corrected estimates for heteroskedasticity, White and Newey-West HAC, were not significantly different. Values of the *t*-statistic are in parentheses.

*Significant at the 10 percent level. **Significant at the 5 percent level. ***Significant at the 1 percent level.

The empirical evidence shows that even though most variables had the expected sign, only four variables were statistically significant. Sales had a positive effect on employment, with a 10 percent increase in sales raising employment by 4 percent. This supports the hypothesis that when a company's sales increase, it needs more workers to handle the extra production and, hence, more employees are hired. The application of new methods of production (innovation) has had a strong impact on employment. A 10 percent increase in this application raises employment by 16.5 percent.

The amount of red tape and government regulations becomes a burden on small businesses, increasing their cost of production. If the paperwork increases by 10 percent, small firms must hire 7 percent more labor to accommodate the additional work. Finally, the receptiveness of the entrepreneur to information on new developments in the market coming from his or her employees had a negative impact on employment. This is assumed to be linked with the idea that as entrepreneurs become more receptive to the environment around them, they are acting in less stable markets.

This article also sought to investigate whether a difference exists between the determinants of male and female employment by estimating separate employment

equations. In terms of the sign of the impact of explanatory variables, no difference was detected. However, there is a difference in the range of magnitude. Female employment is more difficult to account for, as is documented by the lower coefficient of determination. Also, innovation has a larger impact on female employment, suggesting that innovative firms are more female labor intensive.

The empirical evidence of this article relates to a number of issues raised in the introduction. The most important of them relate to regional policy, firm size, and the mechanism by which such firms respond to a change in market conditions. The empirical evidence has certain implications for policy making. The most important one for regional employment policy is the role of innovativeness. Policy makers should support the undertaking of innovative activities by small regional firms. Even though it was not statistically significant, the results concerning the year of establishment suggest that policy makers should support small regional firms in the beginning of their business life. This evidence provides support for evidence of a microversion of the infant industry argument. Policy makers should not support countries or regions but innovative firms in the beginning of their entrepreneurial life.

Firm size, measured by employment levels, is determined by a number of interesting variables, such as the required paperwork. Apart from the negative impacts on costs, the evidence reported in this study shows that cross-country comparisons of firm size, in terms of employment levels, might have no meaning if they are not adjusted by the required paperwork in each region. This varies considerably between different governments. It also varies between different regions in the presence of independent regional administrations. Empirical studies that examine inter-regional and international differences in employment should take government bureaucracy into account because the impact is different. Such regional differences are recently reported in a study done for the United Kingdom; see Carter et al. (2002).

The empirical evidence suggests a certain mechanism of how entrepreneurial regional firms react to changes in market conditions. The direct impact of market uncertainty on employment is not statistically significant. If one interprets receptiveness to new ideas as being an indirect measure of a subjective evaluation of market uncertainty, then an increase in market uncertainty reduces employment. Thus, the creation of a common economic and monetary union in Europe can increase regional employment if it leads toward a more stable market environment.

Future research should focus on a number of issues. First, the sample size is very small, which is a problem that cannot be solved by adding more firms because of limitations imposed by the size of the independent regions. However, panel data can be used to examine the dynamic structure of entrepreneurial business and, thus, would offer a better understanding of how these interrelationships affect small firms. Second, a distinction should be made between exporting and nonexporting firms in employment creation in small regional firms. Third, spillover innovative effects should be examined by analyzing the interactions of both intraregional and

interregional firms. Fourth, the results of this study can benefit from cross-regional and cross-country comparisons. Pooled data from various regions and countries can provide more insight into regional employment creation.

NOTES

1. An operational definition of organizational culture for empirical purposes and the development of an organizational model to account for culture-related effects on organizational performance, such as labor productivity, has been proposed by Morgan (1993). An increase in labor productivity increases the demand for labor.

2. Greece is divided into fifty-two such regions that are important for policy purposes. For example, the investment incentives are related to the region of a firm's establishment. The new investment law of 1998 links the investment incentives of firms to employment creation and takes into account the unemployment rate of each region to determine the level of investment subsidies and tax breaks.

3. Overall, thirteen different choices from agriculture to various services were given that were codified into four basic sectors.

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