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Determinants of New Firm Formation in Taiwan

Su-wan Wang

ABSTRACT. The main objective of this paper is to explore the factors influencing new firm formation in Taiwan. The paper makes use of both cross-sectional and time-series data for the period 1986–2001, using the fixed effect model to try to determine the factors affecting new firm formation. The impacts of industry health, production costs, capital cost, number of employed persons, the unemployment rate, and the economic growth rate are found to be more or less as anticipated. However, only production costs, capital cost, and the unemployment rate are significant with confidence levels of 95% and 90%, respectively. The results also suggest that Taiwan currently is located at the unemployment borderline proposed by Hamilton, and thus a recession-push is already operating, while a prosperity-pull is starting to make itself felt.

KEY WORDS: new firm, prosperity-pull, recession-push, unemployment

1. Foreword

According to Taiwan's tax registration data, as of 1997 there were over 1 million for-profit enterprises in the country, with over 90,000 new enterprises being established every year. The entry rate has tended to remain at around the 6–7% level. Even during the Asian Financial Crisis, there was no significant reduction seen in the number of new firms being established.

New firms have the ability to challenge existing price structures, preventing existing firms from imposing high prices on the consumer. They also help to promote technical progress and wholesaling efficiency. As a matter of fact, many economic arguments and empirical evidence support the view that new firms are one of the most important sources for growth, structural change, innovation, and employment.

The main objective of this paper is to explore the factors influencing new firm formation in Taiwan. The focus is especially on whether new firm formation is affected by prosperity-pull or recession-push, or by a combination of the two, in the hope that this may open up new possibilities for solving the unemployment problem in Taiwan.

The remainder of the paper is set out as follows. Section 2 reviews the recent literature on the determinants of new firms. Section 3 looks at the current state of new firm formation with a brief examination on the characteristics of new firms in Taiwan. Section 4 describes the model, method, and data used to try to determine the factors influencing new firm formation. In section 5 a brief analysis is followed by a discussion of the empirical results. Finally, section 6 offers some concluding remarks.

2. Literature review

The theory of the firm is one of the cornerstones of economics. In the past, the positive contribution of new enterprises to economic development has mostly been discussed under the heading of 'competition'. Since the days of Adam Smith, economists have learned to expect that the entry of new competitors plays a decisive role in driving prices towards the competitive level, thus promoting technical and allocation efficiency. Moreover, Schumpeter believed that new firms are the main source of the motivating power for technical progress, because they rely on innovation to secure market share.

The last two decades have witnessed an explosion in studies on the economic role of entry and the determinants of new firm formation. Entry is viewed as important to economics,

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Su-wan Wang
Chung-hua Institution for Economic Research
No. 75 Chang-hsing St., Taipei, Taiwan R.O.C.
E-mail: wsw@mail.cier.edu.tw

because a level of profitability in excess of equilibrium would induce entry into an industry. New entrants perform an equilibrating function in the market, in that the levels of profitability and price should be restored to their long-run competitive levels. Under this view, outputs and inputs in an industry are assumed to be homogeneous. That is, the entry of new firms is about business as usual: only that with a new entrant is there more of it.

The importance of understanding the determinants of new business activity should be obvious. An understanding of the dynamics of entry requires an understanding of the determinants of new firm creation. Although there are some disputes about the exact numbers, recent empirical works indicate that new small business starts account for a large proportion of new job creation (Birch (1981). Regarding the factors that influence new firm formation, different starting points lead to the adoption of different research methods. Armington and Acs (2002) examined the role of human capital, training and education, and entrepreneurial environment on new firm formation and emphasized that industrial density, population, and income growth are the main factors to the different regional new firm formations.

Storey (1991) divided the literature into two categories. The first category emphasizes traditional industrial organization theory, examining the impact of the industrial structure on new enterprises' establishment ability. In particular, the industrial organization method is used to verify whether the market structure impedes or speeds up the process of new firm formation. The other research category takes labor market theory as its starting point. Integrated data is used to gain an understanding of the factors influencing new firm formation and lead an individual to decide to become an entrepreneur. The main consideration here includes the changes in the status of the individual within the labor market. It is suggested that there is a relationship between new firm formation and unemployment.

Audretsch (1993) discovered that market structures, the size of the economy, technology, and the overall state of the economy have a significant impact on new firm formation. Robson (1994) analyzed the impact of industry characteristics and macroeconomic factors on the new firm formation rate and found a negative correlation between the unemployment rate and new firm formation. The impact of specific geographic factors could be important to start-up activity across industries. Industry capital intensity also shapes the link between regional new firm formation as suggested by Audretsch and Fritsch (1999).

Interest in the question of whether unemployment leads to an increase or a reduction in new firm formation has led to the development of the prosperity-pull and recession-push hypotheses. Hamilton (1989) suggested that the relationship between unemployment and new firm formation might not be a simple linear relationship. He posited that the relationship is different depending on whether or not a given "borderline" level of unemployment has been reached. Most literature in which interviews or questionnaire surveys were used supports the view that there is a positive correlation between unemployment and new firm formation – examples here include Binks and Jennings (1986) and Vivarelli (1991).

Because of data limitation, most papers related to new firm formation in Taiwan focus on case study only. Moreover, as Taiwan had previously for many years enjoyed low unemployment rates of less than 3%, new firms and unemployment have not been important issues and were largely ignored for a long time.

3. The current state of new firm formation in Taiwan

According to Taiwan's tax registration data, as of 1997 there were over 1 million for-profit enterprises, with over 90,000 new enterprises being established every year. The entry rate has tended to remain at around the 6–7% level. Even during the Asian Financial Crisis, there was no significant reduction in the number of new firms being established. However, from 1998 onwards the number of new firms being established each year did start to fall. In 2001, only 71,402 new firms were established.

The majority of newly established firms are in the wholesaling, retailing, and restaurant

sectors. In 1998 there were 66,669 new firms in these sectors, accounting for 63.51% of all new firms. In 2001, owing to the global economic downturn, the number of newly established wholesaling, retailing, and restaurant firms fell to 59,984, and the percentage of these firms to all new firms fell to 62.53%. However, business services and social and personal services have now become Taiwan's new "star" industries.

The total operating revenue of all new enterprises established in 1998 was just under NT$480 billion. By 2001 this had risen slightly to NT$490 billion. More than 50% of this revenue is derived from new firms in the wholesaling, retailing, and restaurant sectors. However, the share of new finance, insurance, and real estate firms to total new enterprises' operating revenue rose from just under 4% in 1998 to 15% in 2001.

In 2001 the internet access service provider industry enjoyed the fastest rate of growth in Taiwan. For other industry segments there was little change in the rankings between 1998 and 2001. This situation partly reflects the fact that entry barriers in these industries are low. It also reflects increased demand for these kinds of services.

In 1998 over 60% of new firms had capitalization of less than NT$1,000,000. By 2001, the percentage of new firms with capitalization of less than NT$1,000,000 had risen to 71%. There is thus a tendency for the capitalization of new firms to converge towards the NT$1,000,000 level.

Over the years, Taipei City and Taipei County have always accounted for the highest percentage of new firms. This is partly because of their high populations and convenient transportation links, but also because they possess strong industry networks and a good public service infrastructure. The level of urbanization and the cluster effect also both have a major impact on new firm establishment.

4. Statistical model and research methodology

This study uses the same kind of research framework used in Evans and Jovanovic (1989) and Blanchflower and Oswald (1990). It is assumed that the motivation for the establishment of a new firm by an individual or group is from a comparison of the anticipated return with the return on the activity in which they are currently engaged. An entrepreneur may or may not currently be employed. The anticipated rate of return is treated as an increasing function of the level of demand in the industry, and a decreasing function of production costs. At the time of new firm establishment (for the purchase of buildings and machinery, or for working capital), it is anticipated that there is a negative correlation between the rate of new firm formation and interest rates.

As for those entrepreneurs currently employed, their opportunity cost when establishing a new firm is their salary. The higher their current salary is, the higher the opportunity cost will be. For unemployed entrepreneurs, research conducted in other countries indicates that the opportunity cost is the total amount of unemployment benefits that they are entitled to. Taiwan did not institute unemployment insurance until 1998, and the maximum period for which unemployment benefits can be claimed is 6 months. Our interviews with unemployed entrepreneurs reveal that they generally wait until the period in which they are entitled to unemployment benefits has expired before starting their business. It is therefore decided that it would be inappropriate to use unemployment benefits as an opportunity cost for new firm establishment by unemployed entrepreneurs.

As for the unemployment rate, this is used mainly to examine the recession-push hypothesis, in order to gain an understanding of whether an increase in the unemployment rate stimulates new firm formation in Taiwan. It is anticipated, assuming the recession-push hypothesis to be correct, that there will be a positive correlation between the number of new firms established and the unemployment rate. To examine whether the prosperity-pull hypothesis can be applied to Taiwan, the economic growth rate is used as an indicator of changes in the overall economic health of the nation. If the prosperity-pull hypothesis is correct, then the higher the economic growth rate is, the more new firms will be established. It is also assumed that entrepreneurs will normally want to establish a business

in an industry with which they are already familiar, and therefore the larger the number is of people employed in a given industry, the more new firms will be established in that industry.

This study attempts to determine the factors affecting new firm formation in nine major industry sectors[1], with the agriculture, forestry, and fisheries sector being excluded. For the number of new firms established, demand levels, salary levels, and the number of existing firms, the data available includes both data for individual industries and time series data. Real interest rates, the unemployment rate, and other economic indicators all fall under the category of macroeconomic variables. Only time series data is available for these.

The model for the factors influencing new firm formation is as follows:

$$\mathrm{NF}_{it} = f(D_{it}, W_{it}, E_t, R_t, G_t) \quad (1)$$

Here:

- NF_{it}: the number of new firms established, represented by the number of new for-profit enterprises established.
- D_{it}: the level of demand in the industry in question, represented by the real GDP share of the ith industry.
- W_{it}: the salary level in the industry in question, represented by employees' average monthly salary.
- E_{it}: the number of people employed.
- R_t: the real interest rate, represented by the Central Bank's discount rate (deflated by the GDP deflator).
- U_t: the unemployment rate.
- G_t: the health of the economy, represented by the economic growth rate.

This study focuses on new firms in Taiwan's nine leading industries, using pooled data (cross-sectional and time series data). There are significant disparities between the different industries in terms of industry structure, and as the study covers a period of 15 years the industry structure may have changed over time; that is to say, each industry may have different intercept terms. In order to avoid distortion, in this study the fixed effect model or least square dummy variable model is used. Of course, the tests for serial correlation and heteroskedasticity are also considered to see whether we should compute a robust variance matrix estimator for the pooled OLS estimator and increase the statistics validity. Because serial correlation in panel data models biases the standard errors and causes the results to be less efficient, a new test for serial correlation in fixed-effects models derived by Wooldridge (2002) is attractive, because it can be applied under general conditions and is easy to implement.

The figures used in this study for the number of newly-established for-profit enterprises are based on data published by the Ministry of Finance. Aside from the *Bulletin of Domestic and Overseas Economic Indicators* published by the Statistics Department, Ministry of Economic Affairs, data for earlier periods are also taken from the *Monthly Bulletin of Financial Statistics of the R.O.C.* published by the Statistics Department, Ministry of Finance. Data for the unemployment rate, economic growth rate, production value in different industries, average monthly wages in different industries, and number of people employed in different industries are taken mainly from data published by the Directorate General of Budget, Accounting and Statistics, Executive Yuan. As for interest rates, these are based on the Central Bank's discount rate given in the *Monthly Bulletin of Financial Statistics*. The period investigated is from 1986 to 2001.

5. Empirical results

The results obtained from the pooled cross-sectional and time series data used in this study are as follows:[2]

$$\begin{aligned}\mathrm{NF}_{it} = {} & 37516.88^{*}D_{it} - 0.02^{*}W_{it} + 0.01^{*}E_{it} \\ & (2.02)^{*} \qquad (-0.48) \qquad (6.02)^{**} \\ & + 199.22^{*}R_t + 758.57^{*}U_t + 132.70^{*}G_t \\ & (0.95) \qquad (1.66)^{*} \qquad (1.23)\end{aligned} \quad (2)$$

The variables in Equation (2) have the same meanings as in Equation (1). Figures in parentheses are t values, * indicates significance of other than 0 at a confidence level of 90%, and **

indicates significance of other than 0 at a confidence level of 95%.

The intercept terms for the different industries are as follows:

Mining and quarrying: −3539.06
Manufacturing: −43223.11
Water, electricity, and gas: −4094.27
Construction: −6419.36
Wholesaling, retailing, and restaurant: 14739.66
Transportation, warehousing, and communications: −8671.36
Finance, insurance, and real estate: −11523.17
Industrial and commercial services: −2060.95
Social and personal services: −5489.47
$\overline{R}^2 = 0.9680$ $F = 261.44$.

The regression is re-run to test for serial correlation by adding first-order pooled OLS residuals as an extra dependent variable and conducting a standard t test. The statistic under the null hypothesis of no serial correlation is $1.32 < t_{0.95,54} = 1.676$. For the detection of heteroskedasticity, according to what Wooldridge (2002) suggested, the usual R^2 obtained by regressing the squared pooled OLS residuals on the predicted dependent variables and its squares, and after being multiplied by total observations the result will be the asymptotically chi-square under H_0. The test statistic is $3.24 < \chi^2_{2,0.95} = 5.99$. We can then conclude that the coefficient will be efficient and unbiased.

The coefficient for the level of demand (D_{it}) is a positive and quite significant value. This shows that when demand rises (indicating that the prospects for that industry have improved), the number of new enterprises being established will also increase. From the viewpoint of production cost, salary levels (W_{it}) are highly correlated with the cost of establishing a new enterprise and are intuitively the reverse to anticipated profits. In terms of opportunity cost, the higher the salary levels are, the greater the opportunity cost is of establishing a new firm, and the lower the likelihood is that people will actually establish new firms. In Taiwan a negative correlation between actual wage levels and the number of new firms being established is not significant, because many entrepreneurs are self-employed persons who run their business either alone or in a partnership with no paid employees, and they do not attach great importance to personnel costs and the increase in opportunity costs.

The results herein show a positive correlation between the level of employment in the industry in question (E_{it}) and the number of new firms being established. This confirms our hypothesis that the more people there are employed in a given industry, the greater the number is of potential entrepreneurs. The correlation between capital costs (R_t) and new firms' establishment is a negative one, which is the opposite of what we expected. It is because most new firms in Taiwan are small or medium enterprises. An entrepreneur generally obtains the capital needed for a start-up from his/her own savings or those of family members, or by borrowing from friends and relatives. In most cases, the amount of capital secured is enough to keep the business in operation for 3 years or so. It is especially difficult for new entrepreneurs to secure financing from banks. For those few entrepreneurs who have taken out bank loans, they have usually obtained financing by the provision of Loan Guarantees through the Small-Medium Enterprises Credit Guarantee Fund.

A regression analysis of data for the nine major industries over the period 1986–2001 shows a positive correlation between the unemployment rate (U_t) and the number of new firms being established. This is in conformity with the recession-push hypothesis. It may be that unemployed people choose to start new businesses as a means of escaping unemployment, causing the number of new firms established to increase. There is also a positive correlation between the economic growth rate (G_t) and the number of new firms being established, which suggests that the situation in Taiwan also conforms to the prosperity-pull hypothesis, with an improvement in the economy stimulating growth in the number of new firms being established.

The unemployment rate coefficient has a level of significance other than zero only at a significance level of 90%, and the economic growth

rate coefficient is not significant. It may thus be that the situations described by the recession-push and prosperity-pull hypotheses both exist simultaneously in Taiwan. The data available to us at present provides strong support for the hypothesis that a recession-push relationship exists between the unemployment rate and the number of new firms being established. However, support for the view that a prosperity-pull relationship exists between the economy's health and the number of new firms being established is rather weaker. Another possibility is that, as Hamilton suggests, the relationship between the unemployment rate and the number of new firms being established may not be a direct linear one. This reveals that Taiwan is currently situated on the borderline as far as the unemployment rate is concerned. In the past, Taiwan's unemployment rate was low, and so an increase in the unemployment rate encouraged the formation of new firms. However, once the borderline has been reached, if unemployment continues to increase, then new firm formation may actually decline. If Taiwan is just reaching the borderline, then the recession-push hypothesis would apply, and prosperity-push would just be starting to take effect.

For the most part, time series data for other countries supports the view that there is a positive correlation between unemployment and new firm formation. However, the results produced using cross-sectional data or pooled data do not support the recession-push hypothesis. The fact that the results from the pooled data used in our study do support the recession-push hypothesis may be due to the economic system in Taiwan having developed along a different trajectory from the other countries in question. Alternatively, it may be because different variables have been used, because people in Taiwan have a stronger entrepreneurial spirit, or because of set-up error.

Different industries in Taiwan have markedly different industry structures. The results obtained from looking at individual industries are shown in Table I.[3] For most of the industries, when the level of demand increases, the number of new enterprises will also increase. However, the manufacturing industry, the water, electricity, and gas industry, and the transportation, warehousing, and communications industry all show a negative relation between demand and new firm formation. This means that under the decreasing trend, even under good prospects for that industry, the number of new firms decreased.

In terms of opportunity costs, the higher the salary levels (W_{it}) are, the greater the opportunity cost is of establishing a new firm, and the lower the likelihood is that people will actually establish new firms only for the manufacturing industry, the wholesaling, retailing, and restaurant industry, the transportation, warehousing, and communications industry, and the business services industry. In Taiwan most new firms are sole proprietorships or partnerships. Therefore, an entrepreneur's salary level is less important to the anticipated profits.

The results show a negative correlation between the level of employment in the industry in question (E_{it}) and the number of new firms being established for the service industries. Our hypothesis – that the more people there are employed in a given industry, the greater is the number of potential entrepreneurs – is only confirmed by the mining and quarrying industry, the manufacturing industry, and the construction industry.

It can be seen in Table I that the real interest rate or capital costs (R_t) is an important factor in new firm formation for all industries. However, most new firms in Taiwan are small or medium enterprises. The entrepreneur generally obtains the capital needed for start-up from his/her own savings or by borrowing from family members, friends, and/or relatives. This could be the reason why the real interest rate goes conversely to our expectation.

In Table I the new firm formation rate increases when the unemployment rate (U_t) is high for the manufacturing industry, the wholesaling, retailing, and restaurant industry, the transportation, warehousing, and communications industry, and the industrial and commercial services industry, and they all conform to the recession-push hypothesis. The construction industry and the social and personal services industry conform to the prosperity-pull hypothesis when the economy improves in its economic growth rate (G_t) in that large numbers

TABLE I
Regression results by industry

Item	Mining and quarrying	Manufacturing	Water, electricity, and gas	Construction	Wholesaling, retailing, and restaurant	Transportation, warehousing, and communications	Finance, insurance, and real estate	Business services	Social and personal services
Intercept	0.15	−18873.13	1703.35	−10854.43	−125331.5	10667.82	139.02	−28647.85	−2816.84
	(−3.40)**	(−1.57)	(10.00)**	(−7.85)**	(−7.90)**	(7.15**)	(0.04)	(−64.66**)	(−1.18)
GDP share	971.30	−410584.60	−33906.84	2660.66	1575889.0	−22586.71	48426.05	1996114	136516.20
	(0.17)	(−9.75)**	(−8.03)**	(0.11)	(8.40)**	(−2.33)**	(1.67)*	(48.85)**	(2.32)**
Real wage	0.01	−1.76	0.001	0.28	−3.08	−0.05	0.18	−0.31	0.02
	(3.19)**	(−10.88)**	(4.86)**	(14.87)**	(−6.85)**	(−3.07)**	(3.31)**	(−22.60)**	(0.34)
Employment	0.01	0.07	−0.02	0.02	−0.03	−0.02	−0.03	−0.05	−0.002
	(3.28)**	(11.40)**	(−6.49)**	(5.50)**	(−0.63)	(−4.12)**	(−4.47)**	(−51.69)**	(−1.15)
Real interest rate	9.06	3375.64	−6.22	−252.44	1188.02	−405.26	−335.91	2414.21	−242.48
	(4.45)**	(12.49)**	(−3.68)**	(−4.57)**	(3.47)**	(−13.24)**	(−2.84)**	(43.04)**	(−4.24)**
Unemployment rate	0.15	6168.86	−24.19	187.62	2847.94	482.58	−896.49	1235.97	−11.79
	(0.02)	(12.88)**	(−4.23)**	(0.99)	(4.43)**	(11.26)**	(−2.54)**	(37.25)**	(−0.09)
GDP growth rate	−2.11	−181.68	−6.87	147.46	340.08	205.88	−47.78	−99.12	71.48
	(−1.57)	(−1.57)	(−5.08)**	(4.58)**	(1.70)*	(15.49)**	(−0.57)	(−9.92)**	(2.09)**
R2	0.5378	0.8184	0.6109	0.9292	0.7833	0.9712	0.5410	0.9984	0.8598

Note: t values are reported in parentheses below the coefficient estimate.
* and ** represent significance at the 10% and 5% levels, respectively.

of new enterprises appear. For the wholesaling, retailing, and restaurant industry and the transportation, warehousing, and communications industry, an improvement in the economy and an increase in the unemployment rate both contribute to new firm formation, which thus conform to both the recession-push and prosperity-pull hypotheses. As the unemployment rate has increased in Taiwan over the last 2 years, the government could have taken industry characteristics into consideration to reduce the number of unemployed and also stimulate economic growth.

6. Conclusions and recommendations

The literature suggests that new enterprises make a significant contribution to the creation of new jobs, to the promotion of economic growth, to raising labor competitiveness, and to strengthening innovation. New enterprises are thus viewed as an important "activating agent" for an economy; in that promoting the establishment of new enterprises can stimulate economic development. Research into the factors influencing the establishment of new enterprises has thus far been of great importance, so that a government can formulate relevant policies and review its existing ones.

This study has used pooled data covering the period 1986–2001, implementing the fixed effect model to investigate those factors influencing new firm formation. The impacts of industry health, production costs, capital costs, number of people employed, the unemployment rate, and the economic growth rate are all found to be more or less as anticipated. However, only industry health and the number of people employed are significant at a confidence level of 95%. The unemployment rate is significant at a confidence level of 90%, while the other factors are not significant.

A positive correlation is found between the unemployment rate and the number of new firms being established, which is in conformity with the recession-push hypothesis. A positive correlation is found between the economic growth rate and the number of new firms being established, which suggests that the prosperity-pull hypothesis also applies to Taiwan. That is, the phenomena described by the recession-push and prosperity-pull hypotheses do exist simultaneously in Taiwan. Alternatively, Taiwan is right on the unemployment borderline as described by Hamilton, such that a further increase in the unemployment rate will lead to a reduction in new firm formation.

As different industries in Taiwan have different industry structures, we also have examined individual industries and found that the manufacturing industry, the wholesaling, retailing, and restaurant industry, the transportation, warehousing, and communications industry, and the industrial and commercial services industry all conform to the recession-push hypothesis, and that the construction industry, the wholesaling, retailing, and restaurant industry, the transportation, warehousing, and communications industry, and the social and personal services industry all conform to the prosperity pull hypothesis.

Notes

[1] The agriculture, forestry, and fisheries sector could not be included in the model, because of the lack of employment and salary data.

[2] The log-linear form is rejected by the BM Test as suggested by Bera and McAleer and the linear form is used in this paper.

[3] The result for individual industries were obtained using the OLS method.

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