The influence of some macroeconomic factors on the growth of micro firms in the United States

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ABSTRACT

The purpose of this study was to investigate the influence of some aggregate domestic economic forces (i.e., government consumption expenditures and gross Investment; gross private domestic investment, and personal consumption expenditures) on the growth of micro firms (businesses with fewer than 20 employees) in the United States between the years 1988-2012. The study classified micro firms into three categories (a) firms with employment between 0 and 4 employees, (b) firms with employment between 5 and 9 employees, and (c) firms with employment between 10 and 19 employees. In aggregation, the firms are termed "very small enterprises" by the U.S. Census Bureau. The data for the period 1988-2012 was reviewed, analyzed, and subjected to statistical analysis. It was found that a strong positive correlation exists between each of the aggregate domestic forces and the number of micro firms in each of the three categories of micro firms as well as all micro firms in aggregate. The OLS regression results, with exploratory degree of 84% and above, show that the three macro variables significantly affect the growth of micro firms in the size range 10-19 employees. Moreover, gross private domestic investment and personal consumption expenditures significantly affect the growth of micro firms in the size range 5-9 employees. However, only personal consumption expenditures significantly affect the growth of micro firms in the size range 0 - 4 employees.

Keywords: micro firms, regression, macroeconomic factors, correlation

1. INTRODUCTION

Business firms are the pillars of progress and prosperity in the United States. The contributions of the firms as a group are well demonstrated in real-life by their products, technology, investment, employment, and so on. The firms are of different sizes, resources, outputs, and competitiveness. Interestingly, an important cluster of firms, which is referred to in this paper as "micro firms" (enterprises that each employs fewer than 20 individuals) seems to have been largely overlooked in the literature. Micro firms operate in various sectors of U.S. economy and are rapidly growing in strength and dominance. These "very small enterprises" (defined by U.S. Census as employing less than 20 employees) employed 17.6% of the total employment in the country in 2012, which was bigger than the 16.7%, the percentage employed by "small enterprises" (defined by U.S. Census as employing 20-99 employees), and was also bigger than 14% which was the percentage employed by "medium enterprises" (defined by U.S. Census as employing100-499 employees). Significantly, of the 5.7 million firms in 2012, 5.1 million, or 89.6 percent, were micro entities. As the tables are presented at the end of the paper in the appendix section, Table 1 shows the category, number, and employment of business firms in the United States in 2012. Table 2 shows the time series data on percentage basis of total employment by different size sectors between 2003-2012. The graph in the appendix shows interesting finding that micro firms had almost consistently been beating small and medium size enterprises in terms of employment percentage over the last few years, even though the share of attention given to these kinds of enterprises has been quite minimal in the research literature. Hence we turned our attention to these firms to explore in details the various factors that lead to their growth and survival.Specifically, the purpose of this study was to explore the influence of some external factors on the employment growth of the firms under discussion for the period 1988-2012. The firms' growth is largely the outcome of their migration from one stage in their life cycle to another stage. The growth was postulated to be mainly the function of three aggregate domestic macro variables:

1) Government consumption expenditures and gross investment. This is a measure of government spending on goods and services that are included in GDP. Consumption expenditures include what government spends on its work force and for goods and services, such as fuel for the military jets and rent for government buildings and the like. Gross investment includes what government spends on structures, equipment, and software, such as new highways, schools, and computers. - See more at: http://www.bea.gov/faq/index.cfm?faq_id=552#sthash.2yP9buyQ.dpuf
2) Gross private domestic investment includes private fixed investment and change in private inventories. It is measured without deduction for consumption of fixed capital (CFC).
3) Personal consumption expenditures. This category refers to the goods and services consumed by individuals in the country.

The postulation made in this paper, which is indicated above, is in line with the external perspective of the Industrial Organization (I/O) view – that external forces constitute the main influencing factors on the firm's performance (David and David, 2015). The contribution of the I/O view to strategic management process is widely acknowledged (e.g., Porter, 1981).

Micro firms are classified in the paper into three categories: First, firms that employ between 0 and 4 individuals (type 1). Second, firms that employ between 5 and 9 individuals (type 2). Third, firms that employ between 10 and 19 individuals (type 3). The U.S. Census Bureau uses the term "very small enterprises" to refer to firms that employ fewer than 20 individuals. Micro firms could be viewed from three perspectives for analytical purposes, as follows:

(1) Growing businesses;
(2) Stagnating businesses; and
(3) Declining (or expiring) businesses.

Table 3 in the appendix provides information for selected years about the share of each group of micro firms in the aggregate universe of micro firms' in the U.S. economy. The Table shows the following:

- Business firms with employment of 0-4 individuals comprised the lion's share of total micro firms, as they included 69.7 percent and 69.1 percent of total firms in 1988 and 2012, respectively.
- The share of each group of micro firms in total firms remained relatively stable from 1988 to 2012, indicating strength of the entire group of firms despite the economic crisis that the U.S. experienced in the 1980's and early 1990's.
- The prevalence of micro firms in the economy.

As mentioned to earlier, this paper was intended to explore the influence of some external factors referred to earlier on the growth of micro firms, namely types1, 2, and 3, individually as well as on all micro firms as a whole. The employment growth of the firms concerned reflects (i) the migration of micro firms from type 1 to type 2, and type 2 to type 3, and (ii) the organic growth of the firms themselves. Growth-oriented firms have been viewed in business literature to be skillful, innovative, and productive. They also thought of to have access to sufficient funds and enjoy managerial and marketing competency. The firms' size and industry affiliation are also believed to be growth-enhancing factors.

2. LITERATURE REVIEW

Investor's Business Daily reported on March 10, 2015 that a survey conducted by SunTrust Bank revealed that 78 percent of small firms in the United States were ready to seek growth opportunities either organically or via mergers and acquisition as well as with the support of private equity. The survey also disclosed that the firms' major concerns were national economic uncertainty, changes in healthcare requirements, and government regulations. Scholars have investigated the factors that influence the growth of small business firms. For example, the forces that influence the growth of software business firms have been investigated by a number of authors. Rehman (2015) explored such factors as the firm's research and development activities, absorptive capacity, knowledge management, organizational culture, access to finance, internationalization, and a host of other variables. Lobos and Szewczyk (2014) identified 22 potential factors that could affect the growth and development of micro and small firms. In their sample of students' owned and managed firms, the authors concluded that human resources, good relations with employees, and favorable business location were significant variables for the firms' growth.. In a study of Portuguese manufacturing firms, Oliveira and Fortunato (2006) concluded that smaller and younger firms have higher growth-cash flow sensitivities than larger and more mature firms. The authors indicated that their findings are consistent with the suggestion that financial constraints of firm growth are relatively more sever for small and young firms than for larger ones. Goedhuys (2010), in discussing high-growth entrepreneurial firms in Africa, concluded that firms that engage in product innovation, having their own transportation means, and connected to the Internet, are characterized by higher growth rates. Moreover, Littunen and Niittykangas (2010) found out a connection between entrepreneurs' know-how and their high-growth firms. In a study about Swedish micro firms. Andersson and Tell (2009) emphasized the influence of managerial behavior on the growth of small firms. Raspe and van Oort (2011) contended that localized knowledge spillover is related to the employment growth level of newly established firms in manufacturing and business service – growth level of employment. Coad and Tamvada (2012), in studying India's micro and small firms, concluded that the firms' size and age had a negative impact on the growth of the majority of them. Michael McPherson (2009) discussed the growth of micro and small enterprises in South Africa. He concluded that the quality of the proprietor, the

location of the firm, and gender of the proprietor are important determinants of growth. As exemplified in the previous discussion, the great majority of published research about competitiveness and growth of business firms has emphasized the internal organizational factors (almost) to the exclusion of the external factors. This kind of analysis is in line with the resource-based view of competitive advantage (e.g. Esteve-Pérez and Mañez-Castillejo, 2008). Resources that contribute to the firm's market superiority are referred to as VRIO, which is an acronym for value-rarity-imitability-organization (Knott, 2009).

RESEARCH METHODS

Data on government consumption expenditures and gross investment, gross private domestic investment, and personal consumption for the period 1988-2012 were gathered from the Bureau of Economic Analysis (http://www.bea.gov). Data on the number of firms for the three types of microforms for the period 1988-2012 are gathered from the Statistical Abstract of USA (https://www.census.gov/) and the U.S. Census Bureau (www.**census**.gov).

We deployed the Pearson Correlation Coefficient to measure the strength of a linear association between the variables studied. In statistics, the Pearson product-moment correlation coefficient (sometimes referred to as the PPMCC or PCC or Pearson's *r*) is a measure of the linear correlation between two variables *X* and *Y*, giving a value between +1 and −1 inclusive, where 1 is total positive correlation, 0 is no correlation, and −1 is total negative correlation. This method is widely used in scientific research as a measure of the degree of linear relationship between two variables.

We ran simple Pearson correlation tests as a first pass to see the strength of relationship between the macro variables and the number of types 1, 2 and 3 firms. Furthermore, we fit a simple linear regression model entering all the independent variables. We use 5% as a level of significance. Then, we used the stepwise regression method with criteria probability in 5% and probability of 10% to build a predictive model for the dependent variables using the specified independent variables.

RESULTS AND DISCUSSION

Pearson Correlation

Table 4 of the appendix shows a strong correlation between the three macro economic variables and the number of micro firms for each category and as whole. This finding prompted us to conduct additional in-depth analysis using OLS regression analysis with the help of EVIEWS and SPSS software.

Ordinary Least Square Regression

We ran ordinary least square (OLS) regression using the number of firms with employment of 0-4, 5-9, and 10-19 individuals as the dependent variable (MICORF) and government consumption expenditures and gross investment (GOVTCI), gross private investment (PRVINV), and personal consumption expenditures (PERSC) as the independent variables. Results are shown in Tables 5, 6, 7 and 8.

Dependent Variable (MICORF):

- Number of firms in thousands that employ between 0 and 4 individuals – NF0to4
- Number of firms in thousands that employ between 5 and 9 individuals – NF5to9
- Number of firms in thousands that employ between 10 and 19 individuals – NF10to19
- Number of firms in thousands that employ between 0 and 19 individuals – NF0to19

Independent Variables:

- Government consumption expenditures and gross investment in $ billions - GOVTCANDI
- Gross private domestic investment in $ billions - PRVINV

- Personal consumption expenditures in $ billions - PERSC

The regression results in tables 5, 6, 7 and 8 appear to be quite interesting. It seems that only when the firm size is between 10-19 individuals, the effect of government consumption expenditures and gross investment, gross private domestic investment, and personal consumption expenditures would all be significant. For smaller firm size, the results are mixed. Gross private domestic investment is by definition represents the savings of households, which are usually deposited in either depository institution like banks and credit unions or gets invested in stock markets. Banks and credit unions take individual savings and channel them into loans, many of which are obtained by micro firms. This could explain why gross private domestic investment is significant in explaining the growth of micro firms in most of the categories. Government spending on consumption as well as investment should have a classic multiplier effect, in addition to an effect on the growth of micro firms. The case of private consumption expenditures is more straightforward. More household spending on products and services sold by micro firms will lead to the firms' growth in revenue and size over time. We also used stepwise regression analysis to construct predictive model as discussed below.

Stepwise Regression Analysis

Stepwise regression method was deployed to determine best factors that affect the growth of micro firms. The method also helps build a predictive model for the dependent variables in conjunction with the independent variables. This method selects the best factors that affect the dependent variables. The results of the analysis are summarized below:

For micro firms with 0 and 4 employees, the predictor model from the stepwise regression is: *NF0to4 = 2863 + 0.308PRVINV* with adjusted R square = 84%, i.e. 84% of the variation in the NF0to4 is explained by the model. The standardized coefficient (Beta) for PRVINV is 0.92, which means per unit ($ billion) increases in PRVINV, the number of firms with 0 - 4 employees would increase by 0.92 unit (thousands), i.e., 920 firms.

For micro firms with 5 - 9 employees, the predictor model from the stepwise regression is: *NF5to9 = 928464 + 102.43PRVINV – 15.25 PERSC* with adjusted R square = 85%, i.e., 85% of the variation in the NF0to4 is explained by the model. The standardized coefficient (Beta) for PRVINV and PERSC are 1.65 and -0.88, respectively. That is, for fixed PERSC, per unit ($ billion) increases in PRVINV, the number of firms with 5 - 9 employee would increase by 1.65 unit (thousands), i.e., 1650 firms. For fixed PRVINV, per unit ($ billion) increases in PERSC, the number of firms with 5 - 9 employee would decrease by 0.88 unit (thousands), i.e., 880 firms. PRVINV has greater significant impact on the number of firms with employment of 5 - 9 individuals than PERSC.

For micro firms with 10 -19 employees, the predictor model from the stepwise regression is: *NF10to19 = 531212 + 54.52 PRVINV +25.37GOVTCANDI – 11.59 PERSC* with adjusted R square = 92%, i.e., 92% of the variation in the NF10to19 is explained by the model. The standardized coefficient (Beta) for PRVINV, GOVTCANDI, and PERSC are 1.10, 0.64 and -0.84, respectively. That is, for fixed PERSC and GOVTCANDI, per unit ($ billion) increases in GDPI, the number of firms with 10 -19 employees would increase by 1.10 unit (thousands), i.e., 1100 firms. For fixed PERSC and PRVINV, per unit ($ billion) increases in GOVTCANDI, the number of firms with 10 -19 employees would increase by 0.64 unit (thousands), i.e., 640 firms. For fixed PRVINV and GOVTCANDI, per unit ($ billion) increases in PERSC, the number of firms with 10 - 19 employees would decrease by 0.84 unit (thousands), i.e., 840 firms. Furthermore, PRVINV has the greatest impact on the number of firms with employees between 10 and 19, followed by PERSC, and then by GOVTCANDI.

For all micro firms between 0 and 19 employees, the predictor model from the stepwise regression is: *NF0to19 = 4690665+ 503.56PRVINV* with adjusted R square = 92%, i.e. the model explains 92% of the variation in the NF0to4. The standardized coefficient (Beta) for PRVINV is 0.96, which means per unit ($ billion) increases in PRVINV, the number of firms between 0 and 4 employees increases by 0.96 unit (thousands), i.e., 960 firms.

5. CONCLUSION

Much of the published analysis about the growth and competitive advantage of business firms was based on the analysis of the firms' internal factors (e.g., managerial skills, labor productivity). This analytical approach is mainly based on the Resource-Based view. This study, however, is based on the Industrial Organization view, in which a firm's success is larely influenced by external variables.

The OLS regression analysis shows that the macro economic variables deployed in the study influence the growth of only micro firms that employ 10 -19 individuals. The stepwise regression points to government consumption and gross investment as the significant variable explaining the growth (in the number) of micro firms.

More research needs to be undertaken for different time periods to investigating, for instance, whether the 1990's were different from the post1990's. It would also be informative and beneficial to conduct analysis to learn the impact on the firms' growth by combining some external and internal variables together. The internal factors might include such variables as organizational efficiency, sales, management style, innovation, and so on.

Appendices:

Table 1. Category, Number, and Employment of U.S. Business Firms, 2012

Category	Number of Firms	% of Total	Employment	% of Total
Enterprises with fewer than 500 employees*:				
(a) Micro firms (very small enterprises; fewer than 20 employees)	5,130,348	89.6	20, 408, 789	17.6
(b) Small enterprises (20 to 99 employees)	494,170	8.6	19,387, 249	16.7
(c) Medium sized enterprises (100 to 499 employees)	83,423	1.5	16,266,855	14.0
(d) Large enterprises (500 or more employees)	18,219	0.3	59,875,575	51.6
Total Firms	5,726,160	100.0	115,938,468	100.0

Source: U.S. Census Bureau
* The U.S. Census Bureau classifies businesses into four categories: (a) very small enterprises (referred to in this study as micro firms), (b) small enterprises, medium enterprises, and large enterprises as indicated in the Table.

Table 2. Percentage of total employment by Enterprise Employment Size 2003-2012

Enterprise Employment Size	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Very small enterprises	18.4	18.4	18.3	18	18.1	17.8	18.1	18.4	17.9	17.6
Small enterprises	17.8	17.9	17.6	17.6	17.3	17.1	16.9	16.6	16.6	16.7
Medium enterprises	14.5	14.6	14.5	14.6	14.2	14.5	14.1	142	14	14
Large enterprises	49.3	49.1	49.6	49.8	50.4	50.6	50.8	50.9	51.5	51.6
Total	100	100	100	100	100	100	100	100	100	100

Source: U.S. Census Bureau.

Table 3. The Growth of Micro Firms, 1988-2012 (In Thousands)

Year	Total Micro Firms (0-19) employees	Firms with Employment of (0-4) individuals	% Of the Total	Firms with Employment of (5-9) individuals	% Of the Total	Firms with Employment of (10-19) individuals	% Of the Total
1988	4,841	3,376	69.7	924	19.1	541	11.2
1990	4,536	3,021	66.6	952	21.0	563	12.4
1995	4,808	3,250	67.6	981	20.4	577	12.0
2000	5,035	3,397	67.5	1,021	20.3	617	12.3
2005	5,358	3,678	68.6	1,050	19.6	630	11.8
2010	5,160	3,575	69.3	968	18.8	617	12.0
2012	5,131	3,544	69.1	993	19.4	594	11.6

Note: Totals may not add up due to rounding.
Source: Ratios were calculated from data published by the U.S. Census Bureau.

Table 4. Correlation Coefficients

		Government Consumption Expenditures and Gross investment in Billions	Gross Private Domestic Investment ($ Billions)	Personal Consumption Expenditures ($ Billions)
Number of Firms hiring between 0 and 4 employees	Pearson Correlation	.871**	.920**	.862**
	Sig. (2-tailed)	0	0	0
	N	25	25	25
Number of Firms hiring between 5 and 9 employees	Pearson Correlation	.693**	.849**	.603**
	Sig. (2-tailed)	0	0	0.001

	N	25	25	25
Number of Firms hiring between 10 and 19 employees	Pearson Correlation	.847**	.926**	.758**
	Sig. (2-tailed)	0	0	0
	N	25	25	25
Number of Firms hiring employees - All US Firms	Pearson Correlation	.878**	.960**	.838**
	Sig. (2-tailed)	0	0	0
	N	25	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5: Regression 1: Firm size 0-4 employees.
Dependent Variable: NF0to4
Method: Least Squares
Date: 02/22/16 Time: 18:00
Sample: 1988 2012
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2844.262	59.75364	47.59981	0.0000
GOVTCI	0.025344	0.079379	0.319282	0.7527
PERSC	0.009768	0.025725	0.379698	0.7080
PRVINV	0.247122	0.072145	3.425356	0.0025

R-squared	0.852778	Mean dependent vary	3391.600
Adjusted R-squared	0.831747	S.D. dependent var	214.5903
S.E. of regression	88.02216	Akaike info criterion	11.93870
Sum squared resid	162705.9	Schwarz criterion	12.13372
Log likelihood	-145.2338	Hannan-Quinn criter.	11.99279
F-statistic	40.54733	Durbin-Watson stat	1.330187
Prob(F-statistic)	0.000000		

Results: Gross private investment is the only statistically significant variable.

Table 6: Regression 2: Firm size 5-9 employees.

Dependent Variable: NF5to9
Method: Least Squares
Date: 02/15/16 Time: 13:09
Sample: 1988 2012
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	931286.1	10365.78	89.84237	0.0000
GOVTCI	96.49606	12.51537	7.710202	0.0000
PERSC	-18.73025	4.462716	-4.197052	0.0004
PRVINV	15.15299	13.77033	1.100408	0.2836

R-squared	0.872098	Mean dependent var	996514.0
Adjusted R-squared	0.853826	S.D. dependent var	39938.74
S.E. of regression	15269.67	Akaike info criterion	22.25077
Sum squared resid	4.90E+09	Schwarz criterion	22.44579
Log likelihood	-274.1346	Hannan-Quinn criter.	22.30486
F-statistic	47.72926	Durbin-Watson stat	0.995700
Prob(F-statistic)	0.000000		

Results: Government investment and consumption expenditure and personal consumption expenditure are statistically significant.

Table 7: Regression 3: Firm size 10-19 employees.

Dependent Variable: MICROF
Method: Least Squares
Date: 03/29/16 Time: 16:10
Sample: 1988 2012
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	531211.6	6426.889	82.65455	0.0000
GOVTCANDI	25.37385	8.537748	2.971960	0.0073
GOVTI	54.51544	7.759661	7.025492	0.0000
PERSC	-11.58638	2.766930	-4.187451	0.0004

R-squared	0.922103	Mean dependent var	596581.5
Adjusted R-squared	0.910975	S.D. dependent var	31730.16
S.E. of regression	9467.351	Akaike info criterion	21.29473
Sum squared resid	1.88E+09	Schwarz criterion	21.48975
Log likelihood	-262.1842	Hannan-Quinn criter.	21.34882
F-statistic	82.86233	Durbin-Watson stat	0.949442
Prob(F-statistic)	0.000000		

Results: All three macro variables are statistically significant.

Table 8: Regression 4: All micro firms combined.

Dependent Variable: NF0to19
Method: Least Squares
Date: 03/21/16 Time: 18:02
Sample: 1988 2012
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4742536.	64107.79	73.97754	0.0000
GOVTCANDI	95.01984	85.16346	1.115735	0.2771
PERSC	-44.81352	27.59994	-1.623682	0.1194

PRVINV	540.8627	77.40210	6.987701	0.0000

R-squared	0.931022	Mean dependent var	5555583.
Adjusted R-squared	0.921168	S.D. dependent var	336346.1
S.E. of regression	94436.19	Akaike info criterion	25.89488
Sum squared resid	1.87E+11	Schwarz criterion	26.08990
Log likelihood	-319.6860	Hannan-Quinn criter.	25.94897
F-statistic	94.48124	Durbin-Watson stat	0.732610
Prob(F-statistic)	0.000000		

Results: Only private investment expenditure is significant in explaining the growth of all micro firms in the U.S. during the period.

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