The Effect of Entrepreneurship on Economic Growth in Alabama

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1. <u>INTRODUCTION</u>

Alabama's economy continues to lag behind national averages on most economic measures. According to The State of Working Alabama, the state's economy continues to lag behind national averages on most economic measures with high rates of poverty (17%), a declining per capita income, low rates of labor force participation and population loss.

One way to address persistent poverty, especially in minority and socially disadvantaged communities, is through entrepreneurship. In recent years, the theoretical link between entrepreneurship and economic growth has received renewed interest by economists. Increased awareness of the role of entrepreneurship as a possible driver for economic growth has politicians, policy makers, academics, corporate heads, and even activist touting the virtues of entrepreneurship. The finding that increased entrepreneurial activity leads to greater economic growth is now well founded at both the national and local level. Reynolds, Hay, and Camp (1999) found that a country's level of entrepreneurial activity can explain a significant portion of the differences in national economic growth rates. In addition to the national link between entrepreneurship and economic growth, researches have focused more attention on this relationship at the local level.   Henderson (2002) determined that entrepreneurs significantly impact local economies by fostering localized job creation, increasing wealth and incomes, and ultimately helping to connect local economies to the larger, global economy.

All though previous research has confirmed a relationship between economic growth and entrepreneurship a statistical relationship cannot establish causal connection

(Kendall & Stuart). This paper seeks to determine the causal relationship between economic growth and entrepreneurship in Alabama. It will contribute to the literature by investigating possible dynamic relations between economic growth, measured by county employment growth rates and two measures of entrepreneurial activity (sole proprietorship and patent activity).

2. ECONOMIC GROWTH AND ENTREPRENERSHIP

The idea that entrepreneurship and economic growth are very closely and positively linked together has undoubtedly made its way since the early works of Schumpeter (1911). An increase in the number of entrepreneurs leads to an increase in economic growth. This effect is a result of the concrete expression of their skills, and more precisely, their propensity to innovate. Schumpeter described this innovative activity, "the carrying out of new combinations", by distinguishing five cases. The introduction of a new good, the introduction of a new method of production, the opening of a new market, the conquest of a new sours of supply of raw materials or half manufactured goods and the carrying out of the new organization of an industry, (1963).

Wennekers and Thurik (1999) and more recently Carree and Thurik (2003) provide extensive surveys of the diverse literature on the relationship between entrepreneurship and economic growth. The literature suggests that entrepreneurship contributes to economic performance by introducing innovation, creating change, creating competition and enhancing rivalry.

3. DATA COLLECTION

Employment Data from 1990-2008 was collected from the Bureau of Economic

Analysis (BEA, 2011). The first set of analysis identifies entrepreneurs as the number of

non-farm proprietors in the county according to the Regional Economic Information

System available from the Bureau of Economic Analysis (REIS). The second set of

analysis identifies entrepreneurship using Patent data covering the period 1990-1999. It

was obtained from the Patent Technology Monitoring Team (PTMT). The PTMT

periodically issues general statistics and miscellaneous reports that profile patenting

activity at the U.S. Patent and Trademark Office (USPTO).

4. <u>TESTING FOR TRENDS</u>

To account for the time structure of economic growth(employment growth rate),

patent and self-employment variables, unit root test are conducted using the

Augmented Dickey-Fuller method; hereafter ADF (Dickey and Fuller, 1979). There is

still controversy regarding whether or not to include the linear trend in conducting unit

root test. For example, McCaskey and Selden (1998) indicated that the ADF

regressions should not include any linear trend as power is lost in a limited sample and

the intercept itself already serves as a trend. On the other hand, Hansen and King

(1998) argued that the time trend is evident for these variables and must be included to

apply the ADF test in its general form. In this paper, unit root tests are performed with

and without a linear trend. For the unit root test, the non-rejection of the null hypothesis

would indicate that the series is characterized by a random walk (Dickey and Fuller,

1979; Davidson and MacKinnon, 1993; Bukenya and Enyinda, 2010)

Table 1 show the unit root test results for the level series, as well as their first

differences. MacKinnon's critical values for testing the null hypothesis for the unit root at

the 5 per cent and 10 per cent levels when a constant is included without a linear trend are -2.87 and -2.57, respectively. For the level series, the null hypothesis of the unit root has been rejected for Employment Growth, Patent and Self Employment at the 5 percent significance level. This suggests that values of employment growth, patent and self employment in Alabama are I(0) as it represents a stationary time series. As expected in the first differences process, the null hypothesis of the unit root is also rejected for Employment Growth, Patent and Self Employment at the 5 percent significance level.

When a linear trend is introduced, MacKinnon's critical values for testing the null hypothesis for the unit root at the 5 per cent and 10 per cent significance levels are -3.42 and -3.13, respectively. Similarly, the null hypothesis of the unit root has been rejected for both the level series and first differences for Employment Growth, Patent and Self Employment; implying that the series do not exhibit a unit root.

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Table 1

Augmented Dickey-Fuller (ADF) Test Results

	Levels	1st Differences	10% Critical Value	5% Critical Value
No Trend				
EMPGROW	26.96*	-56.99	-2.57	-2.87
PATENT	26.22*	-44.44	-2.57	-2.87
SELFEMP	36.90*	-67.03	-2.57	-2.87
With Trend				
EMPGROW	27.11*	-56.97	-3.13	-3.42
PATENT	26.28*	-44.41	-3.13	-3.42
SELFEMP	37.51*	-67.01	-3.13	-3.42

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* indicates significance at 5% level

5. COINTEGRATION ANALYSIS

Non-stationary seems a natural feature of economic life. Legislative change is one obvious source of non-stationarity, often inducing structural breaks in time series, but it is far from the only one. Economic growth, perhaps resulting from technologic progress, ensures secular trends in many time series. The employment growth rate, patent and self employment rate are all found to be stationary at I(0) and therefore don't fit the requirement for cointegration analysis as no variables are non-stationary.

6. <u>TESTING FOR GRANGER CAUSALITY</u>

In order to enhance the existing evidence on the link between entrepreneurship and economic growth for current purposes, the study will perform county level panel causality tests on county employment growth rates and two measures of entrepreneurial activity (sole proprietorships and patent activity). The first measure of entrepreneurial activity, sole proprietorship, has been widely supported in the literature as a good proxy for the level of entrepreneurship. The bureau of Economic Analysis reports the number of sole proprietors based on federal income tax forms filed by individuals of each county. The second measure of entrepreneurship, patent activity, is measured as the number of utility patents (those received for general inventions or innovations) granted annually in each county. The logic behind patent activity as a measure of entrepreneurship rests in the notion that the most direct and visible outcome of the entrepreneurial process is innovation, which should be reflected in the quantity of patents. The causality test procedure used here builds on the Granger (1969) and Sims (1972) causality framework by modifying the test to incorporate the pooled time-series properties of all the rural counties in Alabama. One problem that may arise in using the pooled county data is that the differences across rural Alabama counties may be

significant enough to bias the true time series information that is available in the data. Following the approach of Blomstrom, Lipsey, and Zejan (1996) and Farr, Lord, and Wolfenbarger (1998), state intercept dummies were included in each regression specification to avoid the possible bias by controlling for any state-specific influences.3 Specifically, the effect of the state intercept dummies is to remove the cross-sectional differences of the states, while leaving only the time series variations to be analyzed.

The general Granger-Sims causality test of two variables X and Y, modified for state panel data can be seen in the following equations, where equation (1) tests causality running from X to Y, and equation (2) tests causality running from Y to X.

$$Y_{t,i} = \propto_m + \sum_{m=1}^{M} \propto_m Y_{t-m,i} + \sum_{n=1}^{N} \propto_n X_{t-n,i} + \in_{t,i}$$

$$X_{t,i} = \beta_m + \sum_{v=1}^{V} \beta_v X_{t-v,i} + \sum_{w=1}^{W} \beta_w Y_{t-w,i} + \delta_{t,i}$$

Note that the subscript *i* refers to the corresponding state observation; the error terms $\in_{t,i}$ and $\delta_{t,i}$ are assumed to be white noise; and, the number of lagged values (M and N or V and W) of the independent variables are chosen to adequately capture the relationship between X and Y.

To check for a one-way causal relationship, both directions of causality have to be investigated. In order to test if X Granger causes Y, equation (1) is estimated with and without the lagged X variables, and then an F-test is preformed to test the null hypothesis that $\propto_n = 0$ for n=1,…,N. Rejecting the null hypothesis would show that X Granger causes Y. In order to test if Y Granger causes X, equation (2) is estimated with

and without the lagged Y variables, and then an F-test is performed to test the null hypothesis that $\beta_w=0$ for w=1,….,W. Rejecting the null hypothesis would show that Y Granger causes X. Four findings are possible: (1) neither variable Granger causes the other; (2) y causes x but not vice versa; (3) x causes y, but not vice versa; and (4) y and x Granger causes each other (Granger, 1969).

7. <u>RESULTS</u>

Table 2 shows that at the conventional 5 per cent significance level, the standard causality tests suggest that we can reject the null hypothesis that annual patent grants do not Granger cause economic growth in Alabama. As for the null hypothesis that employment growth does not Granger cause Patent, the null could not be rejected implying the non existence of a feedback effect between EmpGrow and PATENT. Since the null hypothesis that PATENT does not Granger cause EmpGrow is rejected at the conventional 5 per cent significance level while the null hypothesis that EMPGROW does not Granger causes PATENT cannot be rejected at the conventional 5 per cent significance level, it can be concluded that Alabama's number of Patents granted causes employment growth.

Table 2
Pair wise Granger Causality Tests

Null Hypothesis	F-Statistic	Probability
PATENT does not Granger Cause EMPGROW	5.21591*	0.00565
EMPGROW does not Granger Cause PATENT	0.40473	0.66732

*Denotes significance at 5% level

Table 3 shows that the rejection of the null hypothesis for both SELFEMP does not Granger Cause EMPGROW and EMPGROW does not Granger cause SELFEMP. This implies a two way causation between employment growth rate and self employment in Alabama during that time period.

Table 3
Pair wise Granger Causality Tests

Null Hypothesis	F-Statistic	Probability
SELFEMP does not Granger Cause EMPGROW	11.3829*	1.3E-05
EMPGROW does not Granger Cause SELFEMP	1.14781*	0.31766

8. <u>CONCLUSIONS AND IMPLICATIONS</u>

As suspected the relationship between economic growth and employment exists in Alabama. The study determined that there in using the two proxies entrepreneurship there is a one way causation between patent data and economic growth and a double causation relationship between self employment and economic growth. Alabama policy makers should be aware of this relationship when seeking to stimulate economic growth in the state.

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