Do Small Businesses Create More Jobs? Evidence for New York State from Quarterly Workforce Indicators

Arindam Mandal* and Mankirat Singh†

ABSTRACT

The view that small businesses create the most jobs remains appealing to policymakers and small business advocates in the U.S. While early empirical studies provided support for this perception, a variety of subsequent empirical studies have highlighted statistical and measurement pitfalls underlying much of the evidence in support of this perception. Some of these shortcomings were driven by lack of availability of suitable data to properly measure the impact of small businesses on job creation. In this paper, we have used relatively new dataset – Longitudinal Household-Employer Dynamics or Quarterly Workforce Indicators – to revisit the debate on the role of small businesses in job creation in New York State. We find strong evidence that in New York State, small businesses play an important role in overall job creation. However, along with small businesses, large businesses and age of firms also plays an important role in overall job creation.

INTRODUCTION

"Small businesses create 2 out of every 3 jobs in this economy, so our recovery depends on them."
(Obama, 2012)

Since the seminal studies conducted by Birch (1979, 1981, 1987), it has been a recurring question in the discipline of Small Business Economics as to what extent small businesses contribute towards net job creation. This paper contributes to this topic in following ways. First, we use a new dataset – Longitudinal Employer-Household Dynamics (LEHD) or Quarterly Workforce Indicators (QWI) by the U.S. Census Bureau to revisit the debate. Second, we test role of small businesses in job creation primarily for New York State (NYS). Finally, unlike in prior studies which primarily focused on manufacturing, our data caters to a wide range of industries across NYS economy.

It is often claimed that small firms are responsible for a disproportionately large share of new jobs that are created in the U.S. economy. If true, this speaks well of the entrepreneurial spirit of the U.S. economy, whereby newcomers introduce new ideas or production processes that lead to new and improved products or services. This perception is popular among politicians of different political persuasions, small business advocates, and the business press.

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In the provocative work of Birch (1979, 1981, 1987), where he argued that small businesses are the primary engines of job growth, claiming that 66% of all net new jobs in the United States between 1969 and 1976 were created by firms with twenty or fewer employees, and 81.5% were created by firms with one hundred or fewer employees. The important role of small businesses in job creation fit perfectly with the U.S. government's long tradition of supporting small businesses. As early as 1953, the U.S. Congress passed the Small Business Act with the intention of aiding, counseling, assisting, and protecting the interests of small businesses. The Small Business Administration has helped fund – and still continues to - and assist small businesses. The SBA does this by providing loans, contracts, and counseling to small businesses. Birch's findings fed into this thinking and quickly became conventional wisdom. Since then, his findings have often been cited as justification for favorable government regulations, tax incentives, and support programs for small businesses. More recently, President Obama enacted the Small Business Jobs Act of 2010 in hopes to help small businesses thrive and grow towards economic recovery. The SBA Act of 2010 includes reduced fees, higher loan limits, increased funding for start-up costs, coverage of a wider demographic of businesses, and many more policies that will help the creation of small businesses, and in turn, help the creation of more jobs.

Davis et al. (1996) critiqued Birch's conclusions based on both methodology and data quality. More recent studies have found empirical evidence that goes against the lucrative small business theory (Haltiwanger et al. 2013). These studies suggest that there is either no relationship or inverse relationship between firm size and growth. In other words, it does not matter whether on the size of a firm is big or small, it is not the main cause for net job growth.

In this paper we revisit the role of small businesses in creating jobs for New York State using the LEHD or QWI dataset by the U.S. Census Bureau. The rest of the paper is organized as follows: section (II) provides a short literature review, section (III) describes the LEHD or QWI dataset, section (IV) describes different measurement concepts, section (V) discusses econometric model and data analysis and finally section (VI) concludes.

LITERATURE REVIEW

Birch (1979, 1981,1987) provided hard evidences in support of the important role of small businesses in creating majority of jobs in the U.S. Birch's work prompted numerous researchers to consider his methods and to test his hypothesis in different countries. Kirchhoff and Phillips (1988) examine the contribution of small and large firms to U.S. job growth. They find that firms with fewer than 100 employees are the major sources of net job creation. Using Canadian data on the manufacturing sector, Baldwin and Picot (1995) find that net job creation by small manufacturing establishments is greater than that of large establishments. Broersma and Gautier (1997), using firm-level data for the Netherlands, find that small firms contribute more to net job creation than large ones. For the United Kingdom, Barnes and Haskel (2002) find that small

establishments contribute more to net job creation. Voulgaris, Papadogonas, and Agiomirgianakis (2005) also find that small firms create more jobs on net, using data from Greece.

Davis et al. (1996a) criticize the statistical analysis leading to Birch's conclusions based at least three statistical pitfalls, viz. (1) the size distribution fallacy, (2) the confusion between net and gross job creation, and (3) the regression to the mean bias. The dataset in Birch's study was biased since he classified businesses by size for a given base year. When businesses are classified by size for a given base-year, firms that are not small but experienced have a transitory negative shock to their employment will appear to be small for the moment. Additionally, firms that are not small but classified small due to random measurement errors. To avoid statistical pitfalls related to the size distribution fallacy and the regression to the mean bias, Davis et al. propose computing job creation and destruction rates from the base period (t-1) to period t relative to the average employment level in these two periods. They argue that the regression fallacy fully explains the relationship between establishment size and job growth, and they find no systematic relationship between manufacturing plant size and job creation when using the average instead of a base-year size measure. Later Hohti (2000), using data from Finland found a conclusion similar to Davis et al., that there is no clear relationship between establishment size and net job creation

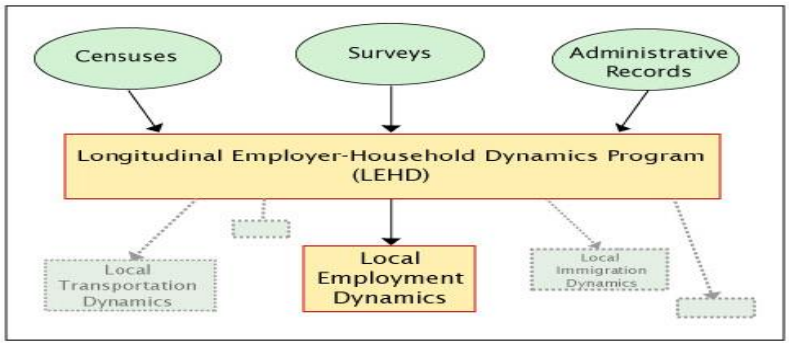
More recently Neumark et al. (2011) recently performed a careful analysis where they avoid the misleading interpretations of the data highlighted by Davis at al. (1996). Using the National Establishment Time Series (NETS) data including coverage across the U.S. private sector from 1992 to 2004, they find an inverse relationship between net growth rates and firm size. Their analysis indicates that small firms contribute disproportionately to net job growth. In addition to a negative relationship between firm size and job creation, Neumark et al. find that the average job destruction for smaller firms are smaller than their average share of job creation. In other words, smaller firms have a positive net job creation rate. However, Haltiwanger et al. (2013) using the U.S. Census Bureau's Longitudinal Business Database (LBD), finds that there is no systematic relationship between firm size and growth once firm age is controlled.

The debate on the role of small businesses is far from being settled. Different studies have used wide range of data sources and reached contradictory conclusions even after correcting for some of the statistical mistakes pointed put by Davis et al. (1996).

DATA

Local Employment Dynamics (LED) is a part of the bigger program by United States Census Bureau called Local Employer-Household Dynamics (LEHD). LEHD uses modern statistical and computing techniques to combine federal and state administrative data on employers and employees with core Census Bureau censuses and surveys. On the other hand, LED is a voluntary partnership between state labor market information agencies and the United States Census Bureau to develop new information about local

labor market conditions at low cost, with no added respondent burden. The difference between LEHD and LED is explained by the following diagram



Source: Quarterly Workforce Indicators, United States Census bureau

Quarterly Workforce Indicators (QWI) provides detailed local estimates of variety of employment and earnings indicators based upon information from LED on a quarterly basis. Employment, earnings, gross job creation and destruction, and worker turnover is available at different levels of geography, typically down to the county or metro area. At each level of geography, they are available by detailed industry (SIC and NAICS), sex, and age of workers. Currently, QWI is available for all the states of the United States, except for Connecticut, Massachusetts, New Hampshire, District of Columbia, Puerto Rico and Virgin Islands.

The Quarterly Workforce Indicators (QWI) are derived from state administrative records and basic demographic information from the Census Bureau. Employment totals from the QWI are not exactly comparable with those from other sources. Generally, coverage and definitions differ between the QWI and data about establishments from administrative records (e.g., the Quarterly Census of Employment and Wages or QCEW), and about workers from surveys (e.g., the decennial census, the American Community Survey, and the Current Population Survey or CPS.). For further information on QWI, refer to Stevens (2007).

For this study we have used Net Employment Change (also Net Job Creation) - the difference between current and previous employment at each business. All the levels data above is converted into rates by dividing the average of present and previous quarter employment. We divide by the average of the present and previous to control for regression fallacy. A pitfall in Birch's study in 1979 was that an additional employee would add too much weight when added to a new firm. To control for this, Davis et al. (1996) suggested that researchers should use the average employment in two periods.

Though LEHD data is available from 2001:Q1 – 2013:Q2, however, our study has been limited to the time period 2005:Q1 to 2013:Q2. This primarily due to the availability of New York State level personal income data from Bureau of Economic Analysis is only available from 2005:Q1. Data is deseasonalized using Census X-13 ARIMA process.

We have five classifications for both size and age. Size class 1 consists of 0-19 employees, size class 2 consists of 20-49 employees, size class 3 consists of 50-249 employees, size class 4 consists of 250-499 employees, and size class 5 consists of 500+ employees. For age classifications, age class 1 consists of 0-1 years, age class 2 consist of 2-3 years, age class 3 consists of 4-5 years, age class 4 consists of 6-10 years, and age class 5 consists of 11+ years. In our study, when we mention small firms we are primarily talking about firms in size class 1 and 2. Size 1 firms are often startup companies who experience fast growth inevitably because of their ability to assemble and acquire capital easily. When we mention large firms, we are talking about firms with 500+ employees. In our research, we have classified young firms, as those who are in age 1 and old firms are 11+ years and older.

THE ESTABLISHMENT-LEVEL AND AGGREGATE GROWTH RATE CONCEPTS

This section describes the job creation rate measures we use in the paper in more detail. Let E_t be employment in year t. In the LEHD, establishment employment is a point-in-time measure reflecting the number of workers on the payroll during the quarter. We measure the job creation rate as follows:

$$g_t = \frac{(E_t - E_{t-1})}{X_t}$$

where

$$X_t = 0.5 * (E_t + E_{t-1})$$

This growth rate measure has become standard in analysis of establishment and firm dynamics because it shares some useful properties of log differences but also accommodates entry and exit. (Haltiwanger et al., 2013)

The above growth rate measure can be flexibly be defined for different aggregations of establishments. For example,

$$g_t = \sum_s \left(\frac{X_{st}}{X_t}\right) g_{st} = \sum_s \left(\frac{X_{st}}{X_t}\right) \sum_{i \in s} \left(\frac{X_{it}}{X_{st}}\right) g_{it}$$

where

$$X_t = \sum_s X_{st} = \sum_s \sum_{i \in s} X_{it}$$

where g_t is the aggregate growth rate and s indexes classifications of establishments into groups defined for any level of aggregation s where s can refer to firm size, or firm age classifications. Thus, the net growth rates for various aggregations of interest are just properly weighted sums of group-level growth rates where the groups are firm size and firm age.

EMPLOYER SIZE, AGE AND NET EMPLOYMENT CHANGE: EMPIRICAL FINDINGS

We take two approaches to investigating whether small businesses create more jobs. First, following the tradition established by Birch (1987) and Davis et al. (1996), we divide businesses into different size and age categories and examine whether there is a significant difference in net job creation rates across firm and establishment size and age categories. Second, we econometrically estimate the relationship between job creation and establishment size and establishment age. Correlations of Net employment change by size and age is given in the following tables.

Table 1: Correlations of Net Job Creation Rate by Firm Size

	Firm Size (0-1)	*Firm Size (20-49)*	*Firm Size (50-249)*	*Firm Size (250-499)*	*Firm Size 500+*	*Firm Size (All)*
Firm Size (0-1)	1.000					
Firm Size (20-49)	0.723	1.000				
Firm Size (50-249)	0.586	0.790	1.000			
Firm Size (250-499)	0.453	0.477	0.560	1.000		
Firm Size 500+	0.260	0.248	0.473	0.499	1.000	
Firm Size (All)	0.636	0.636	0.772	0.667	0.878	1.000

Table 2: Correlations of Net Job Creation Rate by Firm Age

	Age (0-1)	*Age (2-3)*	*Age (4-5)*	*Age (6-10)*	*Age (11+)*	*Age (All)*
Age (0-1)	1.000					
Age (2-3)	0.663	1.000				
Age (4-5)	0.559	0.521	1.000			
Age (6-10)	0.509	0.576	0.373	1.000		
Age (11+)	0.566	0.649	0.629	0.630	1.000	
Age (All)	0.674	0.733	0.679	0.715	0.983	1.000

Table 3: Correlations of Net Job Creation Rate by Firm Size and Age

	Firm Size (0-1)	*Firm Size (20-49)*	*Firm Size (50-249)*	*Firm Size (250-499)*	*Firm Size 500+*	*Firm Size (All)*
Age (0-1)	0.649	0.501	0.517	0.534	0.488	0.670
Age (2-3)	0.458	0.354	0.485	0.480	0.645	0.703
Age (4-5)	0.466	0.547	0.565	0.503	0.550	0.681
Age (6-10)	0.511	0.388	0.479	0.545	0.618	0.704
Age (11+)	0.530	0.589	0.747	0.580	0.873	0.955
Age (All)	0.592	0.606	0.751	0.627	0.871	1.000

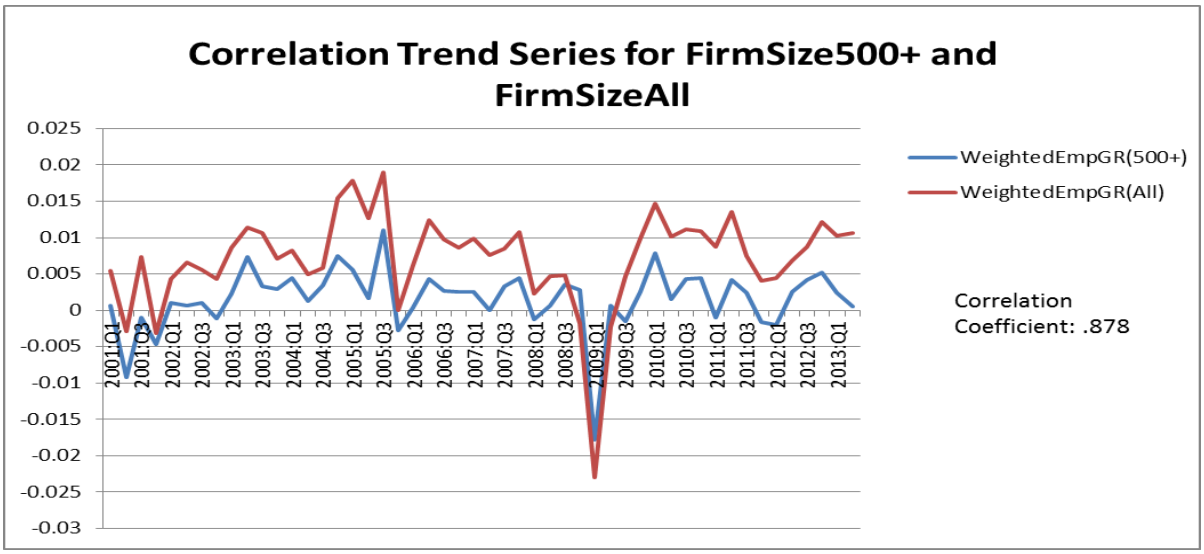
Net employment change rate for New York State (e.g. “Firm Size (All)” and “Age (All)”) is highly correlated with net employment change rate of “Firm Size (500+)”and “Age (11+)”. For example, correlations in net employment change rate for “Firm Size (500+)” and “Firm Size (All)” is 0.878, whereas for other firm sizes this correlation varies between 0.63 and 0.77. Similarly net employment change rate for “Age (11+)” has correlation of 0.983 with “Age (All)”. This correlation for other firm age groups varies between 0.67 and 0.73.

In net employment change rate correlations by size and age, we find that “Firm Size (500+)”and “Age (11+)” are highly correlated at 0.873. This makes sense because older firms are also typically the larger firms. For other age and size groups, the correlation varies between 0.388 and 0.618.

To better understand correlation between two size classes, we graphed two size classifications in table 4.

It is visually apparent that both lines follow a very similar trend line. What this tells us is that the employment growths for firms with 500+ employees have a very large market share, which therefore, is represented by the red line – EMPGR (All) – that aggregates all the employment growth together. In technicality, if firms with 500+ employees, fire a lot of employees, then the aggregate employment growth for all firms will show a decrease that is proportionate to the former. Both lines both very similarly, because employment flows in one class effects employment flows in the other class.

Table 4: Graph of Employment Growth by Firm Size 500+ and Firm Size All



Correlation, however, does not signify causation. To quantify the effects of small businesses on net job creation rate, we use the following specifications.

$$NE_t = \beta_1 + \beta_2 dlog(PI_t) + \beta_3 log(NHE_t) + \beta_4 SF_t + \beta_5 LF_t + \beta_6 AF_t + \varepsilon_t$$

where

NE_t = *Net job creation rate*

PI_t = *Personal income*

NHE_t = *Monthly new hire earnings*

SF_t = *Proportion of net employment by small firms*

LF_t = *Proportion of net employment by large firms*

AF_t = *Proportion of net employment by firms 11yr+*

The control variables in our regression analysis are Personal income *(PI_t),* Monthly new hire earnings *(NHE_t)* and Proportion of net employment by firms 11yr+ *(AF_t).* Personal income is included to account for the macroeconomic factors that affect new job creations. We expect the coefficient of personal income to be positive. The data on personal income is obtained from Bureau of Economic Analysis. Monthly new hire earnings are included to account for the labor market conditions. Higher new hire earnings would imply higher cost of labor and hence less job creation. We expect coefficient of this variable to be negative. The data on monthly new hire earning are obtained from LEHD or QWI. Following Haltiwanger et al. (2013), we controlled for firm age by including the proportion of net employment by firms 11yr+. Both personal income and new hire earning variables are converted into log. The regression results are presented below.

In the table below, different model specifications are marked by (1) – (4). The signs of all coefficients are as we expected in all model specifications. However, statistical significance of the coefficient for

$\log(NHE_t)$ changes based on model specification. For example in model (1), coefficient of $\log(NHE_t)$ is significant and negative, however, coefficient of $\Delta\log(PI_t)$ is positive but insignificant. In model (2), we have included SF_t. The coefficient if SF_t is positive and significant. It implies that net job creation rate generated by small firms plays an important role in overall new job creation rate. However, Haltiwanger et al. (2013) found that when small firms were controlled for age, the importance of small firms in creating jobs is negligible. To account for firm age, we have included the variable AF_t in model (3). The coefficient of AF_t is positive and significant. It implies that age also plays an important role in overall net job creation. However, the size of the coefficient for SF_t declined from 2.377 in model (2) to 0.897 when we controlled for firm age in model (3). Also, coefficient of $\log(NHE_t)$ turned insignificant from significant. In the correlation analysis, we observed that net job creation by large firms are highly correlated with net job creation by firms 11 years and older. Hence, in model (4), we have included LF_t as an additional control variable. The coefficient of LF_t is positive and significant. However, the size of the coefficient of AF_t declined from 1.005 in model (3) to 0.355 in model (4). On the other hand size of the coefficient for SF_t increased to 1.564, whereas the sign of $\log(NHE_t)$ coefficient remained negative but insignificant.

Table 4: Regression Results with Net Job Creation Rate as Dependent Variable

VARIABLES	(1)	(2)	(3)	(4)
$\Delta\log(PI_t)$	0.040482 (0.045155)	0.020228 (0.045295)	0.008709 (0.016526)	0.008671 (0.010193)
$\log(NHE_t)$	-0.073838*** (0.015278)	-0.047611*** (0.012103)	-0.001866 (0.005517)	-0.003086 (0.003408)
SF_t		2.377678*** (0.449377)	0.897290*** (0.195758)	1.564328*** (0.155324)
LF_t				0.721991*** (0.105198)
AF_t			1.005038*** (0.072833)	0.355662*** (0.105198)
Constant	0.537591*** (0.128332)	0.379820*** (0.097764)	0.016703 (0.044288)	0.023934 (0.027337)
R^2	0.602585	0.727724	0.965096	0.987196
Adj. R^2	0.560005	0.699558	0.96011	0.984825

Standard errors in parentheses
*** p<0.01, ** p<0.05

Based on the analysis above, we may conclude that the large firms, small firms and older firms are all important in job creation in NYS. However, in terms of overall impact, perhaps small firms are more important than other firm sizes and age. In this study we have been able to control both firm size and age along with other macroeconomic labor market variables such new hire earnings and personal income.

CONCLUSION

In this study, we have been able to explore the role of firm size and age in job creation. For the purpose, we have used a LEHD or QWI as our primary source of information. Our study have been able to control for firm age, firm size along with other macroeconomic variables affecting labor market such as personal income and new hire earnings. The study finds that both small firms and larger firms play an important role in job creation. Aged firms also play an important role as well. In terms of importance, we find that small firms are relatively more important in creating new employment than larger firms.

REFERENCES

Baldwin, J., & Picot, G. 1995. "Employment generation by small producers in the Canadian manufacturing sector". *Small Business Economics*, *7*(4), 317-331.

Barnes, M., & Haskel, J. 2002. "Job creation, job destruction and the contribution of small businesses: Evidence for UK manufacturing." *U of London Queen Mary Economics Working Paper*, (461).

Birch, D. L. 1979. "The Job Generation Process: Final Report to Economic Development Administration."

Birch, D. L. 1981. "Who creates jobs." *Public Interest*, (65), 3-14.

Birch, D. G. 1987. "Job creation in America: How our smallest companies put the most people to work." *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*.

Broersma, L., & Gautier, P. 1997. "Job creation and job destruction by small firms: An empirical investigation for the Dutch manufacturing sector." *Small Business Economics*, *9*(3), 211-224.

Davis, S. J., Haltiwanger, J. C., & Schuh, S. 1998. "Job creation and destruction." *MIT Press Books*, *1*.

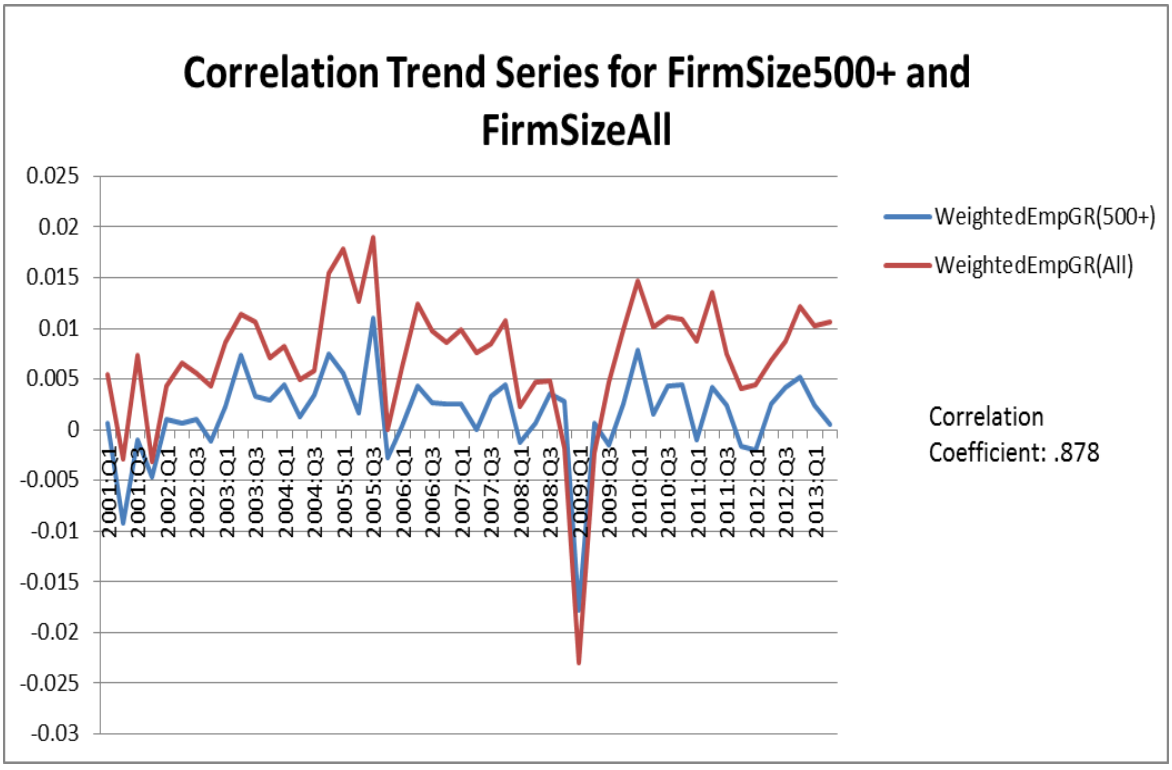
Haltiwanger, J., Jarmin, R. S., & Miranda, J. 2013. "Who creates jobs? Small versus large versus young." *Review of Economics and Statistics*, *95*(2), 347-361.

Hohti, S. 2000. "Job flows and job quality by establishment size in the Finnish manufacturing sector 1980–94." *Small Business Economics*, *15*(4), 265-281.

Kirchhoff, B. A., & Phillips, B. D. 1988. "The effect of firm formation and growth on job creation in the United States." *Journal of Business Venturing*, *3*(4), 261-272.

Neumark, D., Wall, B., & Zhang, J. 2011. "Do small businesses create more jobs? New evidence for the United States from the National Establishment Time Series." *The Review of Economics and Statistics*, *93*(1), 16-29.

Voulgaris, F., Papadogonas, T., & Agiomirgianakis, G. 2005. "Job creation and job destruction in Greek manufacturing." *Review of Development Economics*, *9*(2), 289-301.


Correlation Trend Series for FirmSize500+ and FirmSizeAll
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0.02
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
-0.02
-0.025
-0.03
2001:Q1
2001:Q3
2002:Q1
2002:Q3
2003:Q1
2003:Q3
2004:Q1
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2005:Q1
2005:Q3
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2010:Q1
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WeightedEmpGR(500+)
WeightedEmpGR(All)
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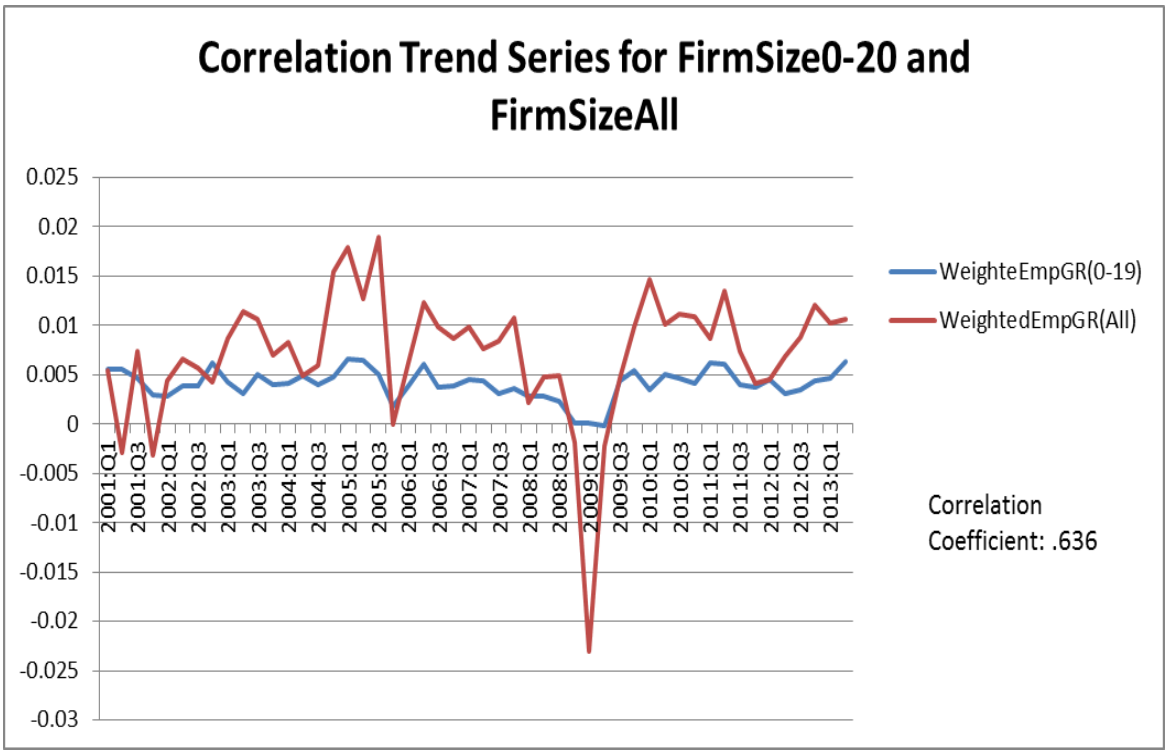
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-0.025
-0.03
2001:Q1
2001:Q3
2002:Q1
2002:Q3
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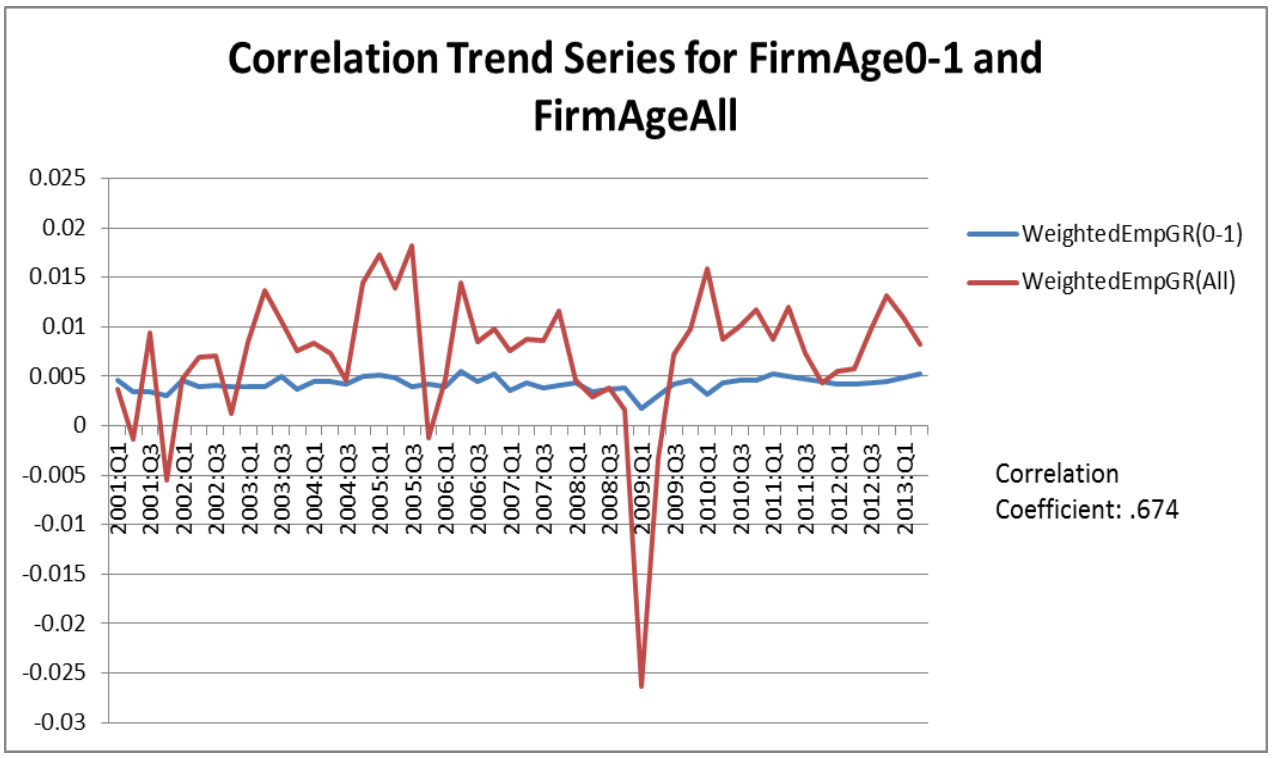
WeighteEmpGR(0-19)
WeightedEmpGR(All)
Correlation Coefficient: .636


Correlation Trend Series for FirmAge0-1 and FirmAgeAll
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0.005
0
-0.005
-0.01
-0.015
-0.02
-0.025
-0.03
2001:Q1
2001:Q3
2002:Q1
2002:Q3
2003:Q1
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2010:Q1
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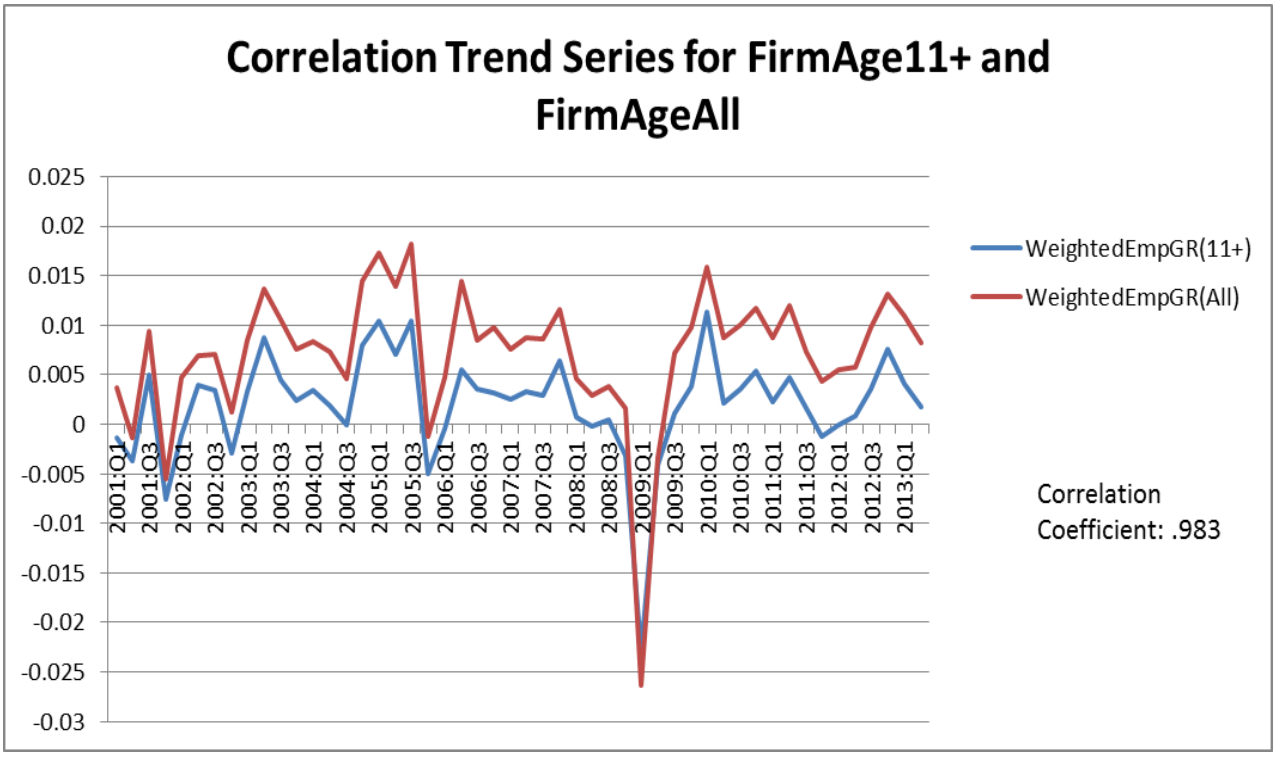
2013:Q1
WeightedEmpGR(0-1)
WeightedEmpGR(All)
Correlation Coefficient: .674


Correlation Trend Series for FirmAge11+ and FirmAgeAll
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0.005
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-0.005
-0.01
-0.015
-0.02
-0.025
-0.03
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2010:Q1
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2011:Q1
2011:Q3
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2012:Q3
2013:Q1
WeightedEmpGR(11+)
WeightedEmpGR(All)
Correlation Coefficient: .983