Small Business During the Business Cycle

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Executive Summary

This study attempts to isolate differences in the relative movement of small businesses and large businesses due to cyclical forces in the economy. It analyzes business size data, primarily GDP, over the business cycles of the past four decades. The economic literature provides little information about potential differences in the activities of small and large businesses during either business cycle expansions or recessions. This is, at least partly, due to a lack of monthly or quarterly data by business size to use in making such an analysis. However, it also reflects the somewhat unsettled state of business cycle theory itself.

The annual data analyzed here do not support broad generalizations about the relative behavior of small business GDP compared to large business GDP during recessions or expansions. However, it is clear that industries tend to react differently to cyclical changes. Some of the most cyclically sensitive industries, such as construction, are made up predominantly of small businesses. Services industries, a very large proportion of small business GDP, tend to be less sensitive to the cycle than other industrial sectors. However, services have grown very rapidly during this time period. That rapid trend rate of growth may mask patterns related to cyclical changes. Because of a difference in the industry distribution between small and large businesses, cyclical differences in industry behavior may be perceived, in aggregated data by business size, as differences in business-size activity. In making a cyclical analysis, the potential for confusion between industry and business-size effects must be considered.

Within some industrial sectors, there appear to be patterns in the small business to large business GDP ratio that reflect relatively consistent cyclical differences. Other sectors, especially those that exhibit strong trend rates of growth, show smaller differences in relative cyclical activity by business size. This does not mean that the firms in those industries are not impacted by cyclical changes, only that they do not appear to be impacted differently in a manner that manifests itself in a noticeable pattern. For example, there is little evidence of noticeable cyclical differences by business size in trade or in the finance, insurance, and real estate industries. The services industry shows only modest cyclical differences by firm size. In the goods-producing

sectors, there are more noticeable differences between small and large business activity during portions of the business cycle. However, they do not follow a generalized pattern. In construction, small firms tend to be more negatively impacted by downturns than large firms, but do slightly better than large firms during an expansion. Manufacturing/mining, especially the noncompensation component, tends to show the opposite pattern from construction. Small businesses tend to do somewhat better in a downturn than large businesses; but they do not grow as fast during an expansionary period. The transportation, communications and utilities sector shows the same pattern as manufacturing/mining. It is the service-producing sector that shows the most noticeable difference in business size activity during the cycle. For the industries that do show some differential cyclical impact, it is often more noticeably tied to noncompensation than to the compensation component of GDP. This is the pattern seen in the mining/manufacturing, TCPU, and construction sectors. There are also indications that some of these relationships have changed during the late 1980s and 1990s. However, there has been only one full business cycle during this period of time. Therefore, it is not possible to assess if these are permanent changes, or if they are associated with cyclical rather than trend forces in the economy.

Cyclical patterns in financial variables are somewhat easier to observe. There is a lack of data on loans by business size. But, similar cyclical behavior is observed in the available data by type of organization. The rate of increase in noncorporate business loans is reduced, and the loans to corporate business often decline, during periods of recession. This probably reflects both lower demand, and a greater difficulty in obtaining loans due to tightened lending standards. The largest increase in loans to both groups occurs a year or two before the peak of the business cycle.

It would be useful if data by business size could be used to construct leading or coincident indicators to show where small businesses are in the business cycle; similar to those constructed by the Conference Board for the entire economy. That was beyond the scope of this project. However, quarterly survey data from the National Federation of Independent Business did provide indications of the direction of movement of small business GDP. Information from that survey is useful as a general signpost of small business' cyclical activity, similar to how the results of the Institute of Supply Management's Purchasing Manager's Survey are used.

Introduction

After the longest expansion in post-war history, the U.S. economy has been through a recession and is struggling to return to a solid growth path. The cyclical behavior of the economy is again a focus of research. However, little research, past or present, has focused on the impacts economic cycles may have on businesses of different sizes. The recent recession has made it clear that businesses of all sizes are impacted by an economic downturn. However, there is no reason to believe that the impacts of a downturn are identical on large and small businesses. If large and small businesses do react differently to downturns or expansions in the economy, is there an explanation for those differences? This study focuses on the behavior of small business compared to large business, and tries to discern if there are differences in their activities related to cyclical changes in the economy. While differences in business size activity and behavior during the downturn of the cycle would be of great interest, there are no business-size data available on a monthly basis. This limits the ability to analyze recession periods in great detail. Consequently, this study will attempt to isolate general cyclical relationships rather than focus narrowly on small business activity over the months of a recession. The primary variable that will be studied is GDP by business size, overall and by industry. Other variables, that could be expected to show some differences in cyclical behavior, will also be examined. Several cyclical indicators will also be examined to see if they are helpful in providing insights to the cyclical changes in small business, or if they can be used to provide indications of change in small business GDP.

General Findings of the Literature Review

The literature review for this research covered several different subject areas. One of the difficulties in a literature review of this type is that there is a great deal not known about the transmission of activities at the micro level through to the macro level. While a study of cyclical impacts on businesses by business size indicates a macro-based study, as this one is, many of the questions that arise about the results are micro-based in origin.

Economic cycles are defined primarily by fluctuations in employment and output. The National Bureau of Economic Research's Business Cycle Dating Committee defines a recession

as "a significant decline in activity spread across the economy, lasting more than a few months, visible in industrial production, employment, real income and wholesale-retail sales. A recession begins just after the economy reaches a peak of activity and ends as the economy reaches its trough. Between trough and peak, the economy is in an expansion. Expansion is the normal state of the economy…"[1] While the popular definition of a recession is two consecutive quarters of declining real GDP, the determination of peak and trough dates is not made in that manner. Although periods identified as recessions often do coincide with two quarters of declining real GDP. Expansions are generally periods of steadily growing GDP. However, even during expansions, the growth rate of economy can vary considerably from one time period to the next.

Whatever the precise identifying characteristics used to determine peak and trough dates, changes in employment, output and income are the macro-economic variables where those impacts can be seen most clearly. However, those macro variables are ultimately determined by a myriad of decisions on a firm-by-firm basis. Many studies have indicated that, at the micro level, there is a continuous churning of business activity, much more so than is visible in most macro indicators.[2] The economy, for the most part, is on a continual upward growth path with only slight pauses or short downturns. However, that does not reflect the situation for individual firms within the economy. Firms are continually being born. Firms grow at different rates. Some firms are contracting, and some fail or are closed for other reasons. To identify or isolate the impacts of the economic cycle in this process is not easy.

The literature on the relationship of cyclical economic activity to businesses by size is limited. General macroeconomic studies on cyclical behavior focus, almost exclusively, on comparing macro-variables to macro-variables in an attempt to explain cyclical behavior. While the theoretical basis for what has traditionally been referred to as the business cycle is of interest in trying to understand cyclical impacts on small businesses, none of the most recent business

[1] "The NBER's Recession Dating Procedure", National Bureau of Economic Research, April 10, 2002. The National Bureau of Economic Research's Business Cycle Dating Committee is made up of several academic economists who examine monthly data series and identify certain months as being the peak of economic activity followed by a later month when the economy reached a trough. The time period between those two is a recession and the time period between a trough and the next peak is an expansion.

[2] Many of the detailed microeconomic studies have focused on manufacturing because of the availability of better data for the manufacturing sector. Unfortunately, those studies provide somewhat limited insights into the overall picture for small businesses since manufacturing is only about 10 percent of small business GDP.

cycle literature has focused on impacts by business size. It is also important to note, that while the nomenclature of the "business cycle" seems to imply a regularity in economic ups and downs, current theory would refute that idea. Current thinking is that the economic "cycle" is the natural pattern of an adjustment process that is triggered by a variety of shocks to the economy. It is likely that the adjustment process does not work in the same way each time and that it may not impact businesses in the same way each time.

The studies that focus on business size are often looking at the variables influencing new start-ups and the variables influencing business closures and business failures. Most studies find that firm-specific variables are highly influential in the survival or dissolution of a firm and that macroeconomic influences are secondary. However, these are often cross-sectional studies and conclusions about the magnitude of cyclical relationships or even the importance of cyclical variables are difficult to determine.[3] Often, there are somewhat conflicting conclusions about the impact of macroeconomic variables on the results. While several studies have made the connection between the underlying churning in economic activity, small business creation, and growth (Audretsch and Thurik, 2001 and Audretsch, 2002) the cause and effect are not at all clear. For example Reynolds states "No matter what measures are utilized, higher levels of business volatility, or creative destruction, appear to have a strong association with economic growth. On the other hand, creative destruction does not, by itself, appear to be a source of economic growth. Without creative destruction, there is no growth; creative destruction does not seem to cause growth."[4] Haltiwanger finds that economic shocks have a stronger impact on job destruction than they do on job creation, but also finds that "even after accounting for observable shocks like oil and monetary policy shocks, much of the cyclical variation in job creation and destruction is accounted for by other (unobservable) factors."[5]

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[3] In addition, many of these studies are of small firms in other countries. That is especially true of studies of firms in nonmanufacturing. In the studies mentioned in this section, small firms in the UK, Portugal and Australia are studied in addition to American companies. While findings are similar to those found in studies of American companies, there is the possibility that differences in the economic systems across countries could produce different results.

[4] Paul Reynolds, "Creative Destruction: Source or Symptom of Economic Growth?" in *Entrepreneurship, Small and Medium-Sized Enterprises and the Macroeconomy*.

[5] John Haltiwanger, "Job Creation and Destruction: Cyclical Dynamics" in *Entrepreneurship, Small and Medium Sized Enterprises and the Macroeconomy*.

Literature discussing business closures and failures is, for the most part, based on cross-sectional studies with some studies based on pooled time-series data. Cross-sectional studies find little evidence of a direct correlation between failures or (voluntary) closures of businesses and normal economic fluctuations. The individual situation of the firm seems to be the largest determinant of its closure through failure or otherwise (Headd, 2000). However, a significant downturn in the overall economy probably does have an impact and tends to speed up failure rates. Certainly poor macroeconomic conditions can cause the failure of the marginal firm even if the underlying cause may be poor management or insufficient capital (Fredland and Morris, 1976). In studies that have specifically looked at the macroeconomic impact on business closures, the results are not always clear. Cressy finds it surprising that macroeconomic fluctuations have so little impact on small business failures although he does find that extraordinary changes in the macro economy do have some impact.[6] Everett and Watson find that improved employment prospects (indicating an improving economy) may increase the chance of a firm's closure and hypothesize that owners make decisions about maintaining a marginal business based on the other options available for their time and other resources.[7] Although Everett and Watson also conclude that macroeconomic (or systematic influences) are influential in 30-50 percent of the closures of the small retail and service firms in their study. Since failures and closures are often influencing the marginal firm, even a noticeable increase in the number of business failures may have only a small impact on the measured output of small business GDP, or even on small business employment.

Several studies have looked at the economy's influence, as well as other variables, on the formation of new businesses. Mata (1996) finds that firm start-ups are pro-cyclical. Audretsch and Acs (1994) find that "…macroeconomic expansion serves as a catalyst for startup activity. However, new-firm startups are apparently promoted by a low cost of capital as well as a high unemployment rate."[8] This would seem to imply that periods at the end of recessions are a good

[6] Robert Cressy, "Small Business Failure: Failure to Fund or Failure to Learn?" in *Entrepreneurship, Small and Medium-Sized Enterprises and the Macroeconomy*, edited by Acs, Carlsson and Karlsson, 1999.
[7] Jim Everett and J. Watson, " Small Business Failure and External Risk Factors", *Small Business Economics*, Volume 11 (1998), pp. 371-390.
[8] David Audretsch and Z. Acs, "New-Firm Startups, Technology, and Macroeconomic Fluctuations", *Small Business Economics*, Volume 6 (1994), pp. 439-449.

time for entrepreneurs to take advantage of incomplete resource use and start new businesses. Mata's research also indicates that the smallest new firms may not be overly impacted by the tightness of credit conditions, possibly because they can most often be financed from an owner's own resources.

Current Business Cycle Literature

The theory of business cycles has evolved over the past few decades. For the most part, current business cycle theorists agree that cycles result, not from a naturally recurring cycle in economic variables, but from unexpected shocks to the economy. The appearance of a cycle comes from the tendency of economic variables to adjust to random shocks in a manner that results in a cyclical pattern. While economists may agree shocks are the main cause of cyclical behavior, they do not agree on which shocks will cause cyclical behavior in major macroeconomic variables. Nor do they agree on exactly how those shocks are transmitted throughout the economy. Real Business Cycle theorists believe that it is the deviation of productivity from its expected levels, also referred to as technological shocks, that leads to the cyclical adjustment pattern. However, that is not a universally accepted explanation. Even were it true, it leaves the reason for the productivity deviation unexplained. With the transmission mechanism and the cyclical trigger(s) still unidentified, there have been no studies that have broaden the theories to explain a differential impact on businesses by business size.

As part of this literature, there has also been a recent discussion about a change in the behavior of many macroeconomic variables over time. Several studies have noted a sharp break in the volatility of many macroeconomic output-related variables since the 1983-1984 time period. There are several theories but no generally accepted explanation as to why this has taken place. Stock and Watson (2002) and Ahmed, Levin and Wilson (2002) posit several possibilities but put at least some of this reduced volatility down to "good luck". While this focus on the general cyclical behavior of the macro-economy has not been broadened to include a study of the differences in these impacts between large and small businesses, it does indicate that there are many possible explanations for observed behavior. The possibility of there being a change in the

volatility of the business-size data itself or at least in its relationship to the broader macro economy during this time period must also be considered.

This research will examine the movement of small business compared to large business variables, primarily GDP measures, in conjunction with the identified dates of business cycle turning points. These are the peaks and troughs identified by the NBER. This is not primarily an analysis of cyclical downturns or recessions. It is a broader analysis of the overall business cycle, expansion and contraction.

Movement of Small Business GDP During the Business Cycle

This study can only look at the relationship of the movement of small business and large business GDP during the overall business cycle. None of the four major monthly data series used by the NBER to determine peak and trough months have firm-size sub-detail. Business-size related data on output, employment, and sales are only available on an annual basis and sometimes with a lag. Since the downturn of the business cycle is often a year or less in length, the restriction to annual data provides limited information about the relative behavior of small and large businesses during those critical months of decline. Consequently, while this analysis provides information about general cyclical relationships, it cannot speak to the specifics of the adjustment process during a recession.

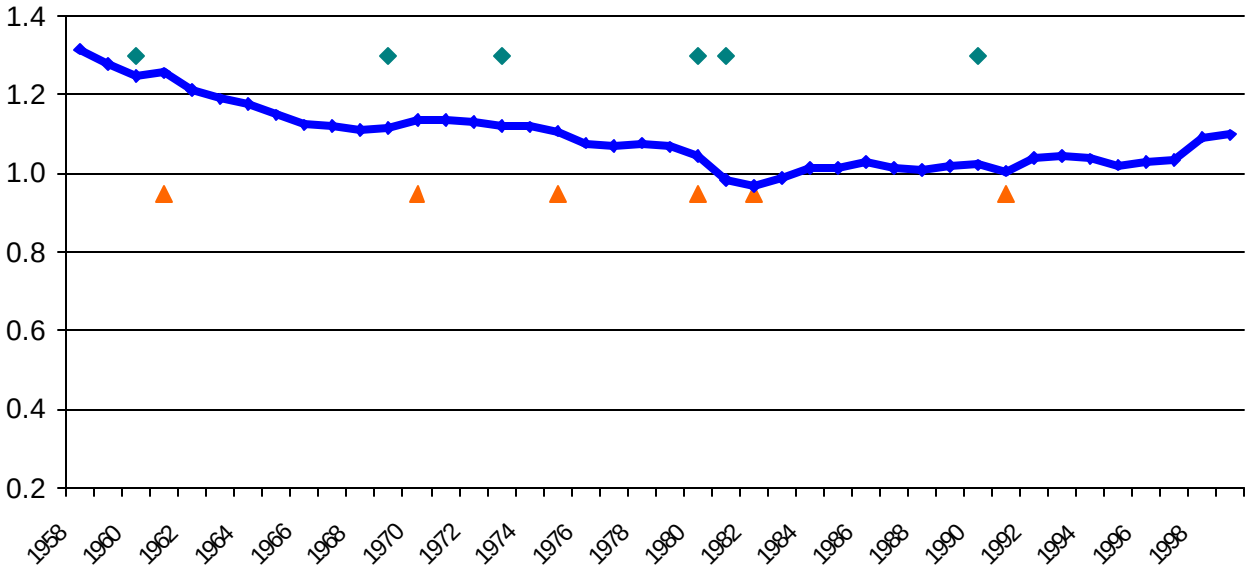
GDP by business size has been calculated for the period 1958 through 1999 for six major SIC-based industrial categories.[9] The calculations are done for industry GDP as a whole, and its major value added components: compensation, net interest, indirect taxes and nontax payments, capital consumption and profit-type income. The latter four are the noncompensation portion of GDP. Total GDP, compensation, and noncompensation are the data used for the first part of the analysis.

[9] Those are: 1) mining and manufacturing; 2) construction; 3) transportation, communications, and public utilities (TCPU); 4) retail and wholesale trade; 5) finance, insurance and real estate (FIRE); and 6) services. While JPC has recently produced preliminary estimates of GDP by business size for the major NAICS-based industry categories, those were only very preliminary estimates produced for one year and are not appropriate for use in this analysis. The current SIC-based estimates have been benchmarked only through 1997, the 1998 and 1999 estimates are preliminary and based on incomplete data.

Several major questions could be asked. However, the main one is how does small business GDP compare to large business GDP during the business cycle? And, do the major sub-components of GDP, compensation and noncompensation, exhibit patterns that provide information about the relationship of the totals?

A first step in looking for possible cyclical relationships is to look at what has happened to GDP by business size during the business cycles of the past few decades. Chart 1 shows the ratio of small private nonfarm business GDP to large private nonfarm business GDP over the 1958-99 time period for which the data are available. Also marked on the chart are the turning points of economic activity, the peaks and troughs of the business cycle, as identified by NBER.

Chart 1: Ratio of Small Business GDP to Large Business GDP
with NBER Identified Peaks and Troughs of the Business Cycle

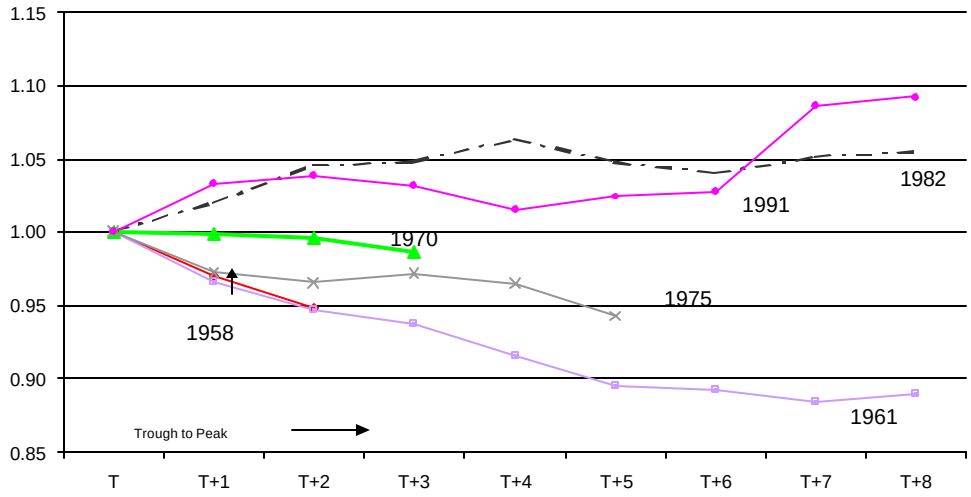


Note: The diamonds on the chart indicate years in which the NBER has identified cyclical peaks and the triangles are years in which there were cyclical troughs. The latest identified peak, in March 2001, is not shown on this chart because the GDP data by firm size are currently only available through 1999.

When the ratio in Chart 1 is equal to 1, the nominal value of small business GDP is equal to large business GDP. The ratio was at a high of 1.3 in 1958, during a period of strong small business activity. Its low point is 0.96 in 1982, indicating that small business GDP was smaller than large business GDP. Since the early 1980s, the ratio has moved above one again. From Chart 1, there is no immediately noticeable pattern in the ratio related to the turning points of the business cycle. The longer term trends in the ratio are the most dominant factor.

To better focus on potential cyclical patterns, the movement of the small to large business ratio is compared during the expansion phase of several recent business cycles. Chart 2 shows a comparison of the small to large business ratio for six of the business cycles of the past forty-five years.[10] The ratio is set equal to 1.0 in the year of the trough of each business cycle and the relative movement in the ratio is tracked through the expansion until the year of its peak. During

Chart 2: Private Nonfarm GDP (in current dollars)
Movement in the Ratio of Small to Large Business During Recent Expansions



[10] The trough and peak periods are determined by the NBER. The six shown are as follows: 1958 cycle has a trough in April 1958 and a peak in April 1960; 1961cycle has a trough in February 1961 and a peak in December 1969; 1970 cycle has a trough in November 1970 and a peak in November 1973; 1975 cycle has a trough in March 1975 and a peak in January 1980; 1982 cycle has a trough in November 1982 and a peak in July 1990; and 1991cycle has a trough in March 1991 and a peak in March 2001 (although the data in these charts only goes through 1999). The only cycle during this period that is excluded is the July 1980 to July 1981 expansion which was extremely short and can't be analyzed with annual data.

the 1958, 1961, and 1975 expansions, small business lost ground relative to large business. In the 1970, 1982, and 1991 expansions, small business maintained its share or gained a bit.

The relationships in Chart 2 do not indicate a "typical" pattern in small business activity relative to large business activity during periods of economic expansion. It would be helpful to also look at the recessions, but they are too short to analyze in this manner. The varying patterns in the ratios during the expansions are due to a combination of different factors. Those include a generalized decline in the share of small business during the first half of this period, a reversal in that trend, at least in part due to a shift in the economy from a goods-producing base to a service-producing base, and periods of differing inflation. While there are likely to be cyclical influences on the ratio as well, they are not easily discerned in the charts because of the other factors.

Thus, a more organized method of identifying the cyclical relationships is needed. One method is to use simple regressions to measure changes in GDP by business size relative to changes in total GDP. Table 1 shows the results of those regressions estimated for 1958-1999. Three simple regressions were run for each of the two business sizes using the general form:

$$\text{Business Size GDP}_t = a_o + a_i \text{ Total Private Nonfarm GDP}$$

$$\text{Business Size Compensation}_t = a_o + a_i \text{ Total Private Nonfarm Compensation}$$

$$\text{Business Size All Other GDP}_t = a_o + a_i \text{ Total Private Nonfarm All Other GDP}$$

The variables on both the sides of the equations are in percentage change form (measured using the change in the natural logs of the variables). The coefficient a_0 is the constant term of the regression, which in this case can be considered a measure of the trend rate of growth in the business size variable. The coefficient a_i is a measure of the percentage increase in the business size variable that is associated with a one percent increase in the total GDP variable.

TABLE 1: Percentage Change in Small and Large Business GDP and their Major Components Associated with a One Percent Change in Total GDP and its Components for the Period 1958-1999

Regressions are estimated using the change in the natural logs (percent change) of current dollar variables

Component Being Explained		Trend	Percent Increase in Component being Explained when Explanatory Variable Increases 1 Percent	Explanatory Variable	R-Square
(1) Small Business GDP	$a_{0,i}$	**0.0039**	**0.9170**	Total Private Nonfarm GDP	0.8656
	SD	0.0045	0.0570		
	t-stat	0.8584	16.0798		
(2) Large Business GDP	$a_{0,i}$	**-0.0039**	**1.0896**	Total Private Nonfarm GDP	0.8886
	SD	0.0048	0.0609		
	t-stat	-0.8168	17.8906		
		Trend		Explanatory Variable	R-Square
(3) Small Business Compensation	$a_{0,i}$	**0.0059**	**0.9234**	Total Compensation Component of Private Nonfarm GDP	0.8961
	SD	0.0039	0.0496		
	t-stat	1.5017	18.5995		
(4) Large Business Compensation	$a_{0,i}$	**-0.0053**	**1.0687**	Total Compensation Component of Private Nonfarm GDP	0.9240
	SD	0.0038	0.0484		
	t-stat	-1.3893	22.0747		
		Trend		Explanatory Variable	R-Square
(5) Small Business Noncompensation	$a_{0,i}$	**0.0064**	**0.8421**	Total NonCompensation Components of Private Nonfarm GDP	0.7380
	SD	0.0064	0.0790		
	t-stat	0.9996	10.6624		
(6) Large Business Noncompensation	$a_{0,i}$	**-0.0093**	**1.2248**	Total NonCompensation Components of Private Nonfarm GDP	0.7827
	SD	0.0083	0.1017		
	t-stat	-1.1258	12.0435		

*GDP in this table refers to private nonfarm GDP and consists of compensation for employees, and noncompensation , which include profit -type income, net interest, capital consumption allowances and indirect business taxes.

Equations one and two indicate that on average, over the entire 1958-1999 time period, small business GDP changed by 0.92 percent for each 1 percent change in total GDP. Large business GDP changed by 1.09 percent for each 1 percent change in total GDP. Similar results are obtained for the sub-components of GDP. These results indicate somewhat less cyclical volatile for small businesses, in that the magnitude of the changes in small business GDP are smaller than for the overall economy. However, the results also imply that, on average, a percentage point increase in the overall growth in the economy is associated with a smaller percent increase in small business output. Therefore, when current dollar growth rates are quite low, as they would be during a recession, small business growth rates would be even lower.[11] When growth rates are quite high, such as during a rapid expansion, small business growth rates would again be lower than those of the economy overall.

However, the results in Table 1 could be somewhat misleading if the focus is purely business size. As with Charts 1 and 2, it is not obvious from these results if the relationship is being influenced primarily by business size or by industry. It is well-known that certain industries are more prone to cyclical volatility than others. Since the distribution of small businesses across industries is very different than the distribution of large businesses across industries, the differences in the coefficients relating small and large business GDP to overall GDP could be the result of either a business-size or an industry differential.[12]

Consequently, a further analysis of these data is done in two-steps. The first step is to look at the relative fluctuation of each of the six industrial sectors to the cyclical movement in total private nonfarm GDP. That provides a basis for understanding which of the industrial sectors is more cyclical than the overall economy, and which are less cyclical. The second step is to look for cyclical patterns by business size within each industry sector. Therefore, the relative fluctuation of the large business and small business components in each of the six

[11] Since the variables are measured in current dollars, it is rare for a recession to bring about negative growth in overall private nonfarm GDP. If growth were negative, the regression implies that small business GDP would decline by less than overall GDP; however, that is largely outside the realm of actual experience.

[12] Small business GDP in the latest year is 35 percent services, 25 percent trade, 14 percent FIRE, 11 percent mining and manufacturing, 10 percent construction, and 5 percent TCPU. Whereas, large business GDP is 35 percent mining and manufacturing, 18 percent FIRE, 16 percent TCPU, 15 percent trade, 15 percent services and 1 percent construction.

sectors are compared to the fluctuations in GDP for the industrial sector of which they are a part.

Cyclical Relationships in GDP by Industry

Two sets of regressions were estimated to understand these basic relationships. The first set of regressions relate economic activity in each of the six industry sectors, as reflected by gross domestic product (GDP), employee compensation (CE) and all other gross product (AO), to each of those measures for total private nonfarm GDP.[13] The all other GDP variable is also referred to as the noncompensation sub-component. This set of regressions indicates the extent to which the specified industry fluctuates with the overall cyclical movement of the private nonfarm economy. The second set of regressions relates each of the three GDP components, for each of the two business sizes, to the same variable for the overall industry. These regressions measure the extent to which GDP for each business-size fluctuates compared to its industry. If there were no differences in the cyclical relationships by business size, one would expect that this second set of regressions would be similar within each industry. If they are very similar, it implies that overall it is the industry rather than the size of the business that is the major determinant of any cyclical relationships.

The results of the industry regressions, shown in Table 2, are analyzed first. These results show the percentage change in each industry sector component associated with each one percent change in the similar measure for the overall economy. These regressions are fit for the period from 1958 through 1999. For each industry sector, the results are shown for three regressions of the general form:

$$\text{Industry GDP}_t = a_o + a_i \text{ Total Private Nonfarm GDP} + b_i \text{ Dummy}$$

$$\text{Industry Compensation}_t = a_o + a_i \text{ Private Nonfarm Compensation} + b_i \text{ Dummy}$$

$$\text{Industry All Other}_t = a_o + a_i \text{ Private Nonfarm All Other} + b_i \text{ Dummy}$$

[13] Gross product by industry has, in the past, been referred to as gross product originating or GPO. However, BEA has changed its nomenclature in recent years to clarify that this is a measure of GDP or value-added by industrial sector. This measure is produced by adding up the major income-side components of each industry: compensation, profit-type income, indirect business taxes and non-tax payments, net interest and consumption of capital. The first makes up the compensation sub-component used in this analysis and the other four are summed to produce "all other" gross product. All of these estimates are in current dollars.

The GDP-related variables, on both sides of the regression, are in percentage change form. Each regression estimates the percentage change in the measure of industry GDP that is associated with each 1 percent change in private nonfarm GDP overall. The first regression shows the relationship between the overall measure of industry GDP and that of private nonfarm GDP combined over all six industries. The two regressions immediately under the GDP regression, shows the relationship of the value-added sub-components for the industry to the sub-components overall. One regression is for compensation and one regression is for the other value-added components. Dummy variables are introduced for years in which the residuals are large enough to affect the values of the regression coefficients in an important way. Those were tested by looking at the regressions without dummy variables, determining which years showed the largest deviations, and testing the impact of removing each of those years from the regression analysis one-by-one. If the dummy variable improved the fit of the regression, but did not change the coefficients of the regression in a significant manner, the dummy was left out.

TABLE 2-Movement of Industry GDP (and its sub-components) Relative to Private Nonfarm GDP (and its sub-components)

Regressions are estimated as percentage changes of current dollar variables, % change in industry component = f(% change in total private nonfarm GDP component)

Regressions are estimated for the 1958-1999 period

Component		TOTAL INDUSTRY Constant	Coefficient	Dummy	R-Square
Mining and Manufacturing					
GDP	$a_{o,i}$	-0.0491	1.4674		0.8342
	SD	0.0081	0.1032		
	t-stat	-6.0386	14.2217		
Compensation	$a_{o,i}$	-0.0410	1.3281		0.8798
	SD	0.0061	0.0775		
	t-stat	-6.7124	17.1412		
Noncompensation	$a_{o,i}$	-0.0664	1.7508		0.7073
	SD	0.0144	0.1772		
	t-stat	-4.6037	9.8820		
Construction					
GDP	$a_{o,i}$	-0.0209	1.2868	-0.1150	0.4979
w/ dummy 81	SD	0.0161	0.2075	0.0349	
	t-stat	-1.2962	6.2004	-3.2954	
Compensation	$a_{o,i}$	-0.0047	1.0980	-0.1010	0.5858
w/ dummy 81,91 (+1,+1)	SD	0.0140	0.1820	0.0220	
	t-stat	-0.3260	6.0170	-4.6080	
Noncompensation	$a_{o,i}$	0.0156	0.8065	0.1564	0.4082
w/ dummy 81,84 (-1,+1)	SD	0.0201	0.2472	0.0362	
	t-stat	0.7765	3.2630	4.3236	
Transportation, Communications and Public Utilities (TCPU)					
GDP	$a_{o,i}$	0.0134	0.7773		0.6424
	SD	0.0072	0.0911		
	t-stat	1.8746	8.5362		
Compensation	$a_{o,i}$	-0.0011	0.9112		0.7277
	SD	0.0069	0.0877		
	t-stat	-0.1570	10.3874		
Noncompensation	$a_{o,i}$	0.0204	0.7432		0.5083
	SD	0.0093	0.1142		
	t-stat	2.1951	6.5073		

Component		TOTAL INDUSTRY Constant	Coefficient	Dummy	R-Square
Wholesale and Retail Trade Combined					
GDP	$a_{o,i}$	0.0086	0.8611		0.7678
	SD	0.0059	0.0746		
	t-stat	1.4577	11.5445		
Compensation	$a_{o,i}$	0.0077	0.8785		0.8945
	SD	0.0038	0.0476		
	t-stat	2.0625	18.4460		
Noncompensation	$a_{o,i}$	0.0057	0.8914		0.5505
	SD	0.0103	0.1261		
	t-stat	0.5558	7.0709		
Wholesale Trade Compensation	$a_{o,i}$	-0.0006	1.0115		0.8607
	SD	0.0051	0.0642		
	t-stat	-0.1129	15.7559		
Retail Trade Compensation	$a_{o,i}$	0.0134	0.7882		0.8082
	SD	0.0048	0.0605		
	t-stat	2.8012	13.0222		
Finance, Insurance and Real Estate (FIRE)					
GDP	$a_{o,i}$	0.0325	0.7063	0.0542	0.5927
w/ dummy 83,94 (+1,-1)	SD	0.0086	0.1090	0.0128	
	t-stat	3.7855	6.4820	3.9399	
Compensation	$a_{o,i}$	0.0426	0.6320		0.3710
	SD	0.0100	0.1274		
	t-stat	4.2406	4.9596		
Noncompensation	$a_{o,i}$	0.0409	0.5598	0.0596	0.4680
w/ dummy 94,78 (-1,+1)	SD	0.0100	0.1230	0.0180	
	t-stat	4.0967	4.5508	3.3134	
Services					
GDP	$a_{o,i}$	0.0397	0.7282	0.0350	0.6745
w/ dummy 82	SD	0.0063	0.0793	0.0133	
	t-stat	6.3007	9.1783	2.6237	
Compensation	$a_{o,i}$	0.0443	0.7558	0.0287	0.6747
w/ dummy 82	SD	0.0065	0.0821	0.0142	
	t-stat	6.7869	9.2017	2.0259	
Nonompensation	$a_{o,i}$	0.0428	0.5282	0.0533	0.5058
w/ dummy 77	SD	0.0082	0.1023	0.0214	
	t-stat	5.2421	5.1609	2.4836	

*GDP is private nonfarm GDP. It consists of compensation , and noncompensation, which includes profit-type income, net interest, capital consumption allowances and indirect business taxes.

As might be expected, the two most cyclically sensitive industrial sectors are the combined manufacturing/mining sector, and the construction sector. In looking at the regressions that compare GDP for those industries to the overall measure of private nonfarm GDP, those two sectors have slope coefficients greater than one. That indicates that for each one percent change in private sector output overall, GDP for those two sectors fluctuates by a greater amount. Those two sectors also have constant terms that are negative. That indicates an overall long-term contraction of these industries.[14]

The other four major industrial sectors have slope coefficients that are less than one. They fluctuate less than the fluctuations in overall GDP. The finance, insurance, and real estate sector (FIRE) shows the smallest slope coefficient, 0.71, but also has one of the poorest fits. Fluctuations in total nonfarm GDP explain less than 60 percent of the variation in GDP for the FIRE sector. The services sector shows the second smallest fluctuation, with a 0.73 percentage point change in output for each 1 percent change in private nonfarm GDP overall. All four of these service-producing sectors also have constant terms that are greater than one, indicating long-term growth (in price and quantity combined) has been positive. The services industry itself also shows the largest constant term, indicating a trend rate of growth of almost 4 percent per year. The service sector results tie in with the view that the service sector is nearly immune to the business cycle (Eckstein and Heien, 1985). Kirk's (1987) research indicates this view is not entirely correct showing, for example, that certain business services exhibit some sensitivity to the business cycle. However, he also shows that health services, and other services with significant government ties, are not strongly influenced by the ups and downs of fluctuating output.[15]

The trade sector has the coefficient closest to one, making it the industry sector that moves most closely with changes in the overall cycle of the economy. It would be expected

[14] These relationships are in current dollar terms. Consequently, the constant term reflects the trend in price and quantity changes together. Price changes in goods-producing sectors have become significantly smaller over time, especially for computer equipment. That is undoubtedly one of the factors impacting the constant term for manufacturing. However, the long-term decline in some basic manufacturing industries in the U.S. is also a "real" or quantity-related result.

[15] This is not to say that those industries are immune from fluctuations. Certainly changes in government spending, or government spending on health care, could have an impact on these service industries. For a discussion of the growth in health services employment see Hiles "Health Services: the Real Job Machine", *Monthly Labor Review*, November 1992, pp. 3-16.

that this sector would show cyclical movements that are timed the same as the peaks and troughs of the overall economy. After all, one of the four variables used to determine the business cycle peak and trough dates is trade sales. However, these results imply that the cyclical magnitudes are also very similar to the weighted average of the economy overall. The results for the trade sector may mask a differing relationship between wholesale and retail trade. In JPC's earlier study on small businesses and business cycles[16], when it was possible to separate the wholesale and retail trade sectors, it was found that wholesale trade was more cyclically sensitive than was retail trade. The underlying data no longer allow a separation between wholesale and retail trade to be calculated for GDP. However, it does allow a separation in the measure of compensation. Consequently, it is useful to look at the sub-components of each of the industrial sectors in relation to the growth in each of the sub-components for the private sector economy.

The analysis of the two major sub-components of GDP, compensation and noncompensation, show similar relationships to those of the industry of which they are a part. Compensation in the mining/manufacturing sector, and the construction sector varies more than does compensation overall. Compensation in the other four major industrial sectors varies by less than does compensation overall.

For compensation, it also is possible to separate the wholesale and retail sectors and examine those relationships separately. The results show that compensation for the wholesale trade sector is more cyclically sensitive than it is in retail trade. This result is probably indicative of the closer tie the wholesale sector has to the cyclically sensitive goods-producing sectors. Wholesale trade's slope coefficient is slightly greater than one. Thus, compensation in this sector is slightly more volatile than the overall private nonfarm economy. Its long-term compensation growth is also very slightly negative. While not statistically significant, that result also makes it more similar to the goods-producing sectors than are the other service-producing sectors. The coefficient relating the rate of change in retail trade's compensation to that of the overall economy is less than 0.8. That implies retail compensation is almost as

[16] The earlier work was entitled "An Analysis of the Effect of Recessions on Small Business' Output" and was submitted to SBA in July 1981 as the final report for grant number SB-1A-00026-01-0.

cyclically insensitive as that of services, a somewhat surprising result.[17] In general, the coefficients that relate the change in overall compensation to industry compensation are all more closely clustered around 1 than are the coefficients that relate industry GDP to overall GDP. That means for the mining/manufacturing sector, and the construction sector, the coefficients are smaller than the overall industry coefficients. But, for the other industry sectors, except for FIRE, the coefficients are larger than the overall industry coefficients. This may well reflect the inter-connected nature of the labor markets across industries as much as anything else.

FIRE has the lowest coefficient of all the industries, reflecting that the compensation in FIRE varies by only 0.6 percent for each 1 percent change in the compensation of the private nonfarm economy overall. This result seems counterintuitive. While the banking sectors in FIRE should be relatively stable during general cyclical upturns and downturns, there are several sub-sectors of FIRE that are heavily dependent on commission payments, such as in real estate and stock brokerage companies. That subset of FIRE would be expected to show a good deal of sensitivity to the cyclical changes in the economy. Possibly, the finance sector is stable enough to dampen the cyclical impacts of the real estate sector. However, the regression statistics indicate only 37 percent of the change in FIRE compensation is being explained by changes in overall compensation and the constant, or trend rate of growth, is quite high. Therefore, the cyclical aspects may be masked somewhat by special factors in this industry, or strong trend growth in the industry may swamp the smaller cyclical changes. [18]

The regressions showing the relationships between the noncompensation components of value-added for each industry and the noncompensation components of the private nonfarm economy overall, are a little more difficult to analyze. Interestingly, only one industry shows a more volatile "all other" component than the total.[19] That is the combined mining and

[17] This may also reflect a relationship between the wage rates that are paid in retail compared to those of the overall economy, as well as the relationship between the hours worked.

[18] In the National Income and Product Accounts, the imputed rent of homeowners is included in the FIRE sector of the economy. However, that complicates an analysis of this type; therefore, the imputed rent of homeowners is removed from the FIRE sector when calculating GDP by size.

[19] That does not mean that all other GDP is less volatile than is compensation. The noncompensation sub-components of GDP show larger percentage changes, on average, than do the compensation components. These

manufacturing sector. The slope coefficient in that regression is 1.75; the noncompensation component for mining and manufacturing varies almost two percent for each one percent change in the noncompensation component overall. For the other industries, the noncompensation components of GDP vary by less than one percent for each percent change in the noncompensation component of the six industries combined. While during the early part of the 1958-1999 time period, over 30 percent of the private nonfarm noncompensation total was accounted for by manufacturing and mining, that share has dropped over time. In the most recent time period, manufacturing and mining make up about 20 percent of the noncompensation total, and FIRE makes up about 24 percent. However, services makes up a relatively small part of the noncompensation total overall, ranging from about 12 percent at the beginning of the period to about 17 percent at the end of the period.

The Relationship of Business Size GDP to Industry GDP

Table 3 shows the results of regressions that estimate the fluctuation in GDP for each business size relative to the fluctuation of its own industry's GDP. The regressions quantify the relationship between the business size component and the similar component for the industry overall. Each industry has three sets of regressions: 1) total GDP; 2) compensation; and 3) noncompensation. The results are presented in the same format as the results in Table 2 and are estimated for the 1958-1999 time period. However, in Table 3, each industry is divided into the small business results (shown on the left side), and the large business results (shown on the right side). What is generally found is that the coefficient for one business size will be larger than one and the coefficient for the other business size will be less than one.

For example, from the industry analysis shown in Table 2, it is already known that the construction industry is more cyclically sensitive than is the overall economy. The fact that the coefficient quantifying the relationship between the small business portion of that industry and the total construction industry is also greater than one, indicates that small business current dollar output in construction is more sensitive to cyclical changes than is the

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relationships are looking at each industry's noncompensation component compared to the sum of the noncompensation components across all industries.

construction industry overall. The coefficient on the large business component is less than one. It is the less cyclically sensitive business size sector within this industry.[20] The mining and manufacturing results show the opposite relationship, with large business being more cyclically sensitive than is small business. Although in that industry both business sizes are within one standard deviation of unity.

Small business is less cyclically sensitive than its overall industrial sector in TCPU, trade, and services. Small businesses are more cyclically sensitive than the sector overall in FIRE. That may reflect the dominance of small businesses in the real estate portion of that sector, while the banking and finance portions of the industry are dominated by large businesses. However, it should also be noted that the slope coefficients for both business sizes in the FIRE and trade sectors fall within one standard deviation of unity.

[20] This may reflect differences within the construction industry between residential and other construction with respect to the business cycle. Small businesses encompass most of the sub-contractor parts of the industry that are often heavily focused on residential construction, such as painters and plumbers. Large businesses are often found in the heavy construction industries that may react differently to the events that trigger downturns in residential construction.

TABLE 3- Movement of Small Business GDP and Large Business GDP Relative to the Industry of Which they are a Part

Regressions are estimated as percentage changes of current dollar values, % Change in Business Size by Industry Component = f (% Change inTotal Industry Component)
Regressions are fit over the 1958-1999 time period

		SMALL BUSINESS				LARGE BUSINESS				
Component		Constant	Coefficient	Dummy	R-Square	Component	Constant	Coefficient	Dummy	R-Square
Mining and Manufacturing						**Mining and Manufacturing**				
GDP	$a_{o,i}$	-0.0010	0.9359	0.0879	0.7770	**GDP** $a_{o,i}$	-0.0011	1.0369		0.9622
w/ dummy 98	SD	0.0060	0.0808	0.0218		SD	0.0024	0.0325		
	t-stat	-0.1703	11.5889	4.0392		t-stat	-0.4704	31.9163		
Compensation	$a_{o,i}$	0.0010	0.9350	0.1099	0.8391	**Compensation** $a_{o,i}$	-0.0017	1.0301		0.9472
w/ dummy 98	SD	0.0049	0.0704	0.0172		SD	0.0026	0.0384		
	t-stat	0.2142	13.2742	6.4001		t-stat	-0.6532	26.7976		
Noncompensation	$a_{o,i}$	0.0066	0.8122	-0.0757	0.6677	**Noncompensation** $a_{o,i}$	-0.0010	1.0554		0.9609
w/ dummy 77,81,82	SD	0.0090	0.0963	0.0239		SD	0.0031	0.0336		
(+1,-1,-1)	t-stat	0.7348	8.4353	-3.1633		t-stat	-0.3182	31.3692		
Construction						**Construction**				
GDP	$a_{o,i}$	-0.0029	1.0406		0.9598	**GDP** $a_{o,i}$	0.0125	0.8558	-0.1136	0.4116
	SD	0.0029	0.0337			**w/ dummy 83** SD	0.0148	0.1720	0.0518	
	t-stat	-0.9884	30.9208			t-stat	0.8468	4.9767	-2.1903	
Compensation	$a_{o,i}$	-0.0017	1.0135	0.0305	0.9390	**Compensation** $a_{o,i}$	0.0017	1.0112	-0.0878	0.4799
w/ dummy 83	SD	0.0034	0.0408	0.0119		SD	0.0146	0.1743	0.0507	
	t-stat	-0.5093	24.8506	2.5701		t-stat	0.1168	5.8030	-1.7308	
Noncompensation	$a_{o,i}$	-0.0007	1.0027	0.0166	0.9890	**Noncompensation** $a_{o,i}$	0.0267	0.6646	0.3209	0.3106
w/ dummy 84	SD	0.0018	0.0189	0.0080		**w/ dummy 64,92** SD	0.0296	0.2958	0.0879	
	t-stat	-0.3789	53.1820	2.0692		**(+1,-1)** t-stat	0.9016	2.2468	3.6484	
Transportation, Communications and Public Utilities						**Transportation, Communications and Public Utilities**				
GDP	$a_{o,i}$	0.0075	0.8398	0.0462	0.4192	**GDP** $a_{o,i}$	-0.0038	1.0683		0.9264
w/ dummy 96	SD	0.0116	0.1523	0.0247		SD	0.0036	0.0476		
	t-stat	0.6468	5.5152	1.8751		t-stat	-1.0599	22.4601		
Compensation	$a_{o,i}$	-0.0007	0.9597	0.0477	0.7555	**Compensation** $a_{o,i}$	0.0009	1.0045	-0.0162	0.9717
w/ dummy 96	SD	0.0063	0.0861	0.0158		**w/ dummy 96** SD	0.0020	0.0280	0.0051	
	t-stat	-0.1134	11.1526	3.0241		t-stat	0.4574	35.8672	-3.1596	
Noncompensation	$a_{o,i}$	0.0383	0.4500	0.1370	0.5688	**Noncompensation** $a_{o,i}$	-0.0121	1.1766	-0.0378	0.9286
w/ dummy 82,84	SD	0.0120	0.1460	0.0220		**w/ dummy 82,84** SD	0.0043	0.0516	0.0078	
(-1,+1)	t-stat	3.1740	3.0840	6.2450		**(-1,+1)** t-stat	-2.8298	22.7872	-4.8519	

TABLE 3 (continued)

Component		SMALL BUSINESS Constant	Coefficient	Dummy	R-Square	Component		LARGE BUSINESS Constant	Coefficient	Dummy	R-Square
Wholesale and Retail Trade Combined						**Wholesale and Retail Trade Combined**					
GDP	$a_{o,i}$	-0.0053	0.9869		0.8959	**GDP**	$a_{o,i}$	0.0127	1.0801		0.6522
	SD	0.0041	0.0531				SD	0.0095	0.1239		
	t-stat	-1.2879	18.5831				t-stat	1.3333	8.7185		
Compensation	$a_{o,i}$	-0.0039	0.9910		0.8541	**Compensation**	$a_{o,i}$	0.0126	1.0293	-0.1108	0.9307
	SD	0.0050	0.0646			**w/ dummy 98**	SD	0.0041	0.0538	0.0086	
	t-stat	-0.7847	15.3349				t-stat	3.0409	19.1349	-12.8705	
Noncompensation	$a_{o,i}$	-0.0067	0.9794		0.8810	**Noncompensation**	$a_{o,i}$	0.0247	1.1135	-0.1430	0.5874
	SD	0.0046	0.0568			**w/ dummy 74**	SD	0.0138	0.1678	0.0418	
	t-stat	-1.4374	17.2400				t-stat	1.7894	6.6362	-3.4209	
Wholesale Compensation	$a_{o,i}$	-0.0017	0.9790		0.9170	**Wholesale Comp**	$a_{o,i}$	0.0074	1.3053	-0.1904	0.7304
	SD	0.0040	0.0470			**w/ dummy 98**	SD	0.0125	0.1561	0.0293	
	t-stat	-0.4549	20.9903				t-stat	0.5932	8.3604	-6.4972	
Retail Compensation	$a_{o,i}$	-0.0064	0.9743	0.0783	0.9877	**Retail Compensation**	$a_{o,i}$	0.0087	1.0501	-0.0866	0.9533
w/ dummy 98	SD	0.0014	0.0191	0.0029		**w/ dummy 98**	SD	0.0032	0.0426	0.0064	
	t-stat	-4.4334	50.8818	27.1244			t-stat	2.6873	24.6485	-13.4795	
Finance, Insurance and Real Estate						**Finance, Insurance and Real Estate**					
GDP	$a_{o,i}$	-0.0157	1.0276	-0.0475	0.8129	**GDP**	$a_{o,i}$	0.0352	0.8626	-0.0678	0.4872
w/ dummy 91,92	SD	0.0075	0.0834	0.0106		**w/ dummy 92**	SD	0.0138	0.1531	0.0278	
(-1,+1)	t-stat	-2.1010	12.3255	-4.4955			t-stat	2.5569	5.6345	-2.4419	
Compensation	$a_{o,i}$	-0.0038	0.9296	-0.0348	0.8904	**Compensation**	$a_{o,i}$	0.0039	1.0438	0.0180	0.9494
w/ dummy 94	SD	0.0056	0.0588	0.0103		**w/ dummy 94**	SD	0.0037	0.0390	0.0068	
	t-stat	-0.6863	15.8021	-3.3699			t-stat	1.0713	26.7490	2.6270	
Noncompensation	$a_{o,i}$	-0.0073	0.9277		0.6343	**Noncompensation**	$a_{o,i}$	0.0619	0.7764	-0.1662	0.4383
	SD	0.0099	0.1106			**w/ dummy 63,92**	SD	0.0230	0.2533	0.0401	
	t-stat	-0.7338	8.3885			**(+1,+1)**	t-stat	2.6876	3.0650	-4.1484	
Services						**Services**					
GDP	$a_{o,i}$	-0.0047	0.9831		0.9596	**GDP**	$a_{o,i}$	0.0045	1.1801	0.0426	0.7851
	SD	0.0031	0.0319			**w/ dummy 60,63**	SD	0.0096	0.0972	0.0101	
	t-stat	-1.4994	30.8423			**(+1,+1)**	t-stat	0.4660	12.1375	4.2248	
Compensation	$a_{o,i}$	-0.0012	0.9556		0.9597	**Compensation**	$a_{o,i}$	0.0039	1.1045		0.8703
	SD	0.0032	0.0309				SD	0.0070	0.0673		
	t-stat	-0.3881	30.8907				t-stat	0.5604	16.4102		
Noncompensation	$a_{o,i}$	-0.0078	1.0375		0.9300	**Noncompensation**	$a_{o,i}$	0.0252	1.2285	0.3070	0.3399
	SD	0.0040	0.0450			**w/ dummy 60,63**	SD	0.0452	0.5024	0.0668	
	t-stat	-1.9654	23.0745			**(+1,+1)**	t-stat	0.5569	2.4452	4.5954	

*GDP is private nonfarm GDP consisting of compensation of employees, and noncompensation (profit-type income, net interest, capital consumption allowances and indirect business taxes.)

The analysis of the sub-components of value-added highlights a few peculiarities in the results. Looking first at the compensation components, the relationship in mining and manufacturing is very similar to the relationships seen for GDP overall. Small businesses are less sensitive, and large businesses are more sensitive than the overall industry. The coefficients in construction seem to defy the relationship discussed earlier, because the compensation of both large and small businesses are shown to be more cyclically sensitive than is the overall sector. Both of the coefficients are close to one, however, indicating little difference by business size in this relationship. The coefficients for large business and small business in the trade sector are also relatively close to one, with large businesses being slightly more sensitive. Interestingly, the breakdown between wholesale and retail shows no differences by business size. Small businesses, in both the wholesale and retail sectors, are slightly less sensitive and large businesses are slightly more sensitive. The services sector shows relatively strong relationships. The movement in small business compensation is less volatile than is the movement in compensation for services overall, while large business compensation appears to be more sensitive. Since the services industry is less sensitive to cyclical changes than is the economy overall, this still does not mean that large service businesses should be considered cyclically sensitive, only that it seems to be more so than small service businesses.

The relationships for the noncompensation components of value-added are somewhat more difficult to analyze. In almost all industries, the noncompensation components of small businesses will change less than will the noncompensation component of that industry overall. The most noticeable exception is services, although the construction coefficient is about equal to one. One would expect from that result that the large business noncompensation components would vary by more than the overall industry. That is generally true except for construction. However, the large business noncompensation component for services also seems to vary by more than the overall industry and has a larger slope coefficient than does small business (albeit with a larger standard deviation as well.) This latter result may reflect a poor fit. The small business equation fits quite well but the large business equation does not. Only 30 percent of the variation in the large business noncompensation component for

services can be explained by the movement in the noncompensation component of services overall; and while the estimated trend growth is quite high, that estimate does not meet the tests of statistical significance.

The tendency for small businesses to show less sensitivity than large businesses could be explained in a couple of ways. First, this outcome could still be related to differences in industrial mix. Even within these industrial sectors there are industrial sub-sectors that could be expected to react differently to cyclical behavior, and there may be a difference in the small and large business shares in those sub-sectors. Secondly, there may be "capacity utilization" differences in how workers are employed in small and large businesses. Large businesses, having several people who do similar jobs, may be more able to remove some people from the payrolls than are small businesses that may have only one or a two people doing a specific job. Thus small business may react to slow business by that person having more slack time. Large businesses are also much more likely to have a variety of businesses in which they are involved. Therefore, in a downturn, for example, large businesses are more likely to shut down or sell an unprofitable division or sub-sector of their businesses than are small businesses. That results in relatively large changes in employment (and compensation) at one time. Finally, it could be related to the relative price movements in the two business size sectors.

The possibility that this was due to relative price differences was examined. A small digression at this point will outline some general, though not conclusive, results of looking at the relationships between inflation adjusted data. Unfortunately, it is impossible to calculate pure small and large business price deflators for these industries. Price statistics are not published (or collected) in a manner that allows one to determine if price changes are different between small and large businesses. However, it is obvious that the price deflators vary by industrial sector. Therefore, differences in price changes over time in one industrial sector compared to another may impact the relationship of the industry to the overall measure of GDP. Consequently, one thing that can be done is to deflate the total industry, and its large and small business GDP measures, with the deflator for that industry. Then the movement in the real series can be compared with that of the real measures of output. The three real

measures tried as explanatory variables were chained GDP, industrial production, and chained GDP for private nonfarm business excluding housing.

The deflated small and large business series were compared directly to the last series. The outcomes were somewhat surprising. In every industry, the deflated small business output measure shows a larger impact from a one percent change in the real GDP measure than does the large business output measure. In all but one industry, the increase in small business output is equal to, or larger, than the percent increase in the GDP measure. Services is again the exception--small business service output continues to be less cyclically sensitive than overall GDP. The results of the analysis based on inflation adjusted data are shown in more detail in Appendix B.

These findings raise complex questions. The major one is why there is a seeming contradiction between the current dollar and constant dollar results for the sensitivity of small businesses. The results imply that prices matter. Unfortunately, how prices matter is not entirely clear. The deflators for each industry, used to estimate real GDP for small and large business, cannot approximate the price movements in the large and small business portions of the industry, equally well. For example, hospitals are a large business dominated services industry and dry cleaners are a small business dominated services industry. The overall price deflator for services is unlikely to proxy the price movements in those two industries equally well. However, for any given industry at this level of aggregation, it is difficult to know for which business size the deflator is more representative. Therefore, which of the deflated relationships is a better measure of the real output relationships cannot be determined. Given the variation in inflation over the time period of this analysis, and the significant differences between inflation in goods-producing and service-producing industries, the potential impact of inflation should be considered.

However, these deflated relationships are complicated and clearly need further study. Prices do matter but the impact of deflation can not always be predicted. This is especially true in trying to determine cyclical relationships since deflation may impact the constant term more than the slope coefficient. Consequently, the deflated relationships are interesting but should be evaluated with caution. They will not be used in the remainder of this analysis.

Results from 1977-1999 Compared to the Full Time Period

As was noted earlier, recent business cycle literature (Stock and Watson, 2002) found that several relationships in the macro economy have become less predictable since the early 1980s, when compared to the relationships between those variables in earlier time periods. Looking back to Charts 1 and 2, this time frame seems to correspond to the change in the pattern of the expansions.

The possibility of a structural change in the business size measures, similar to those found by Stock and Watson, should be considered before proceeding to the next step, testing for differing activity by business size during the cycle. To do this, the GDP regressions by industry and firm-size were estimated for two overlapping time periods. The first from 1958 through 1983, and the second from 1977 through 1999.[21]

For most of the industry regressions, the fit of the regressions was about the same for the full time period and the 1977-1999 time period.[22] The same general results were obtained for the comparisons of the movement in each industry associated with the movement in total private nonfarm GDP. Looking at the most recent time period, the mining/manufacturing sector, and construction were still the most cyclically sensitive sectors. The relationship for mining and manufacturing was very stable, but construction became somewhat more sensitive to fluctuations in total GDP, and the downward trend rate of change in construction became more negative. The trade sector coefficients remained very stable, changing little between the full period and the 1977-1999 period. Somewhat larger changes were observed in the relationships of the compensation and noncompensation sub-components of the trade sector. TCPU, FIRE, and services all continued to have slope coefficients less than one. However, for both FIRE and services, the slope coefficient moved closer to one in the later time period and the relatively large trend rates of growth became slightly smaller. Cyclical sensitivity tests

[21] The regressions were originally estimated for the 1958-1983 period and the 1983-1999 period to correspond with the time periods that Stock and Watson found to be the significant break points in their analysis of the overall macro economy. However, since this analysis is focused on the business cycle, as defined by the turning points in economic activity, it was decided that at least two full cycles needed to be included in the results for the later time period. Consequently, the second set of regressions was estimated using a starting date that was about halfway through the 1975-1980 expansion.

[22] The use of the slightly longer time frame, beginning in 1977 rather than 1983, helped stabilize the relationships. When comparing the total period to the 1983-1999 regressions, one finds somewhat larger differences both in the industry relationships and in the business size relationships.

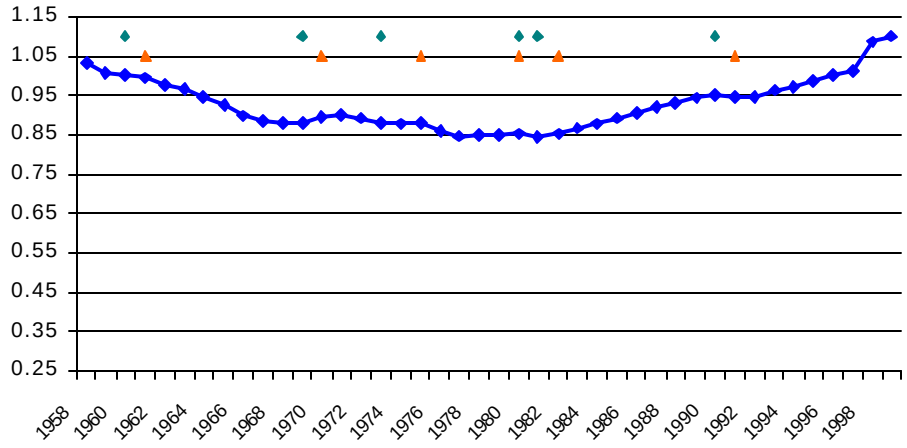
showed very little difference in the industry growth patterns produced by the regressions over the different time periods.

There were some more noticeable changes in relationships between the movement of small and large business GDP and the movement of industry GDP. However, in general, if the coefficient was above one for the entire 1958-1999 period, it remained above one for the 1977-1999 time period. The industry that showed the largest shift in the business size relationships was TCPU. The small business slope coefficient became significantly smaller and its trend rate of growth became larger in the 1977-1999 period than in the longer time period. The regression results for 1977-1999 are shown in Appendix C. As a side note, the relationships for some industries did show significant changes when just the 1983-1999 time period was used to estimate them. However, that time period is too short to put those changes in context with the general cyclical changes in the economy.

Are Changes in Small Business Relative to Large Business Partly Cyclical?

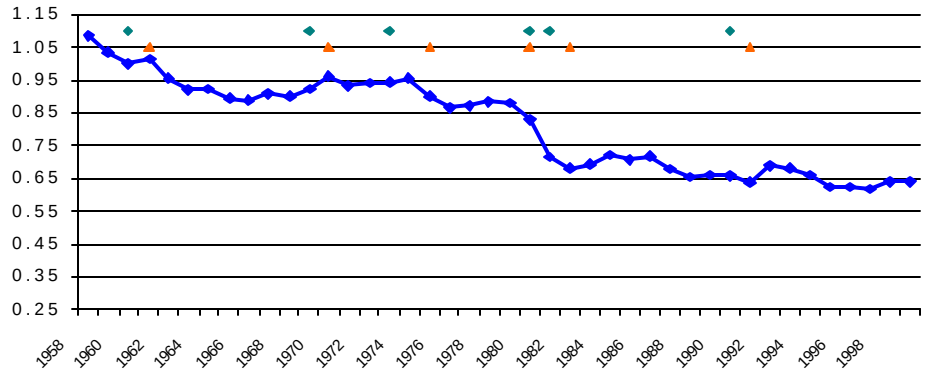
As was seen in Chart 1, the most aggregated data do not show clear signs of a pattern in the ratio of small business GDP to large business GDP during the 1958-1999 period. Overall, a discernable pattern in that ratio around the peaks and troughs of the business cycle

Chart 4: Small Business to Large Business Nonfarm Compensation Component of GDP



was not found. Although, in the two latest recessions, the small business share seemed to have declined, albeit only slightly. Charts 4 and 5 begin to disaggregate the GDP data, much as the regressions presented above have done. Chart 4 plots the ratio of small business compensation to large business compensation against the peaks and troughs of the business cycle (the peaks are the upper marks, the troughs are the lower marks). Chart 5 plots the ratio of small business noncompensation to large business noncompensation, along with the peak and trough

Chart 5: Small Business to Large Business Nonfarm Noncompensation Components of GDP



markers. These are the two major sub-components that make up GDP. The charts show that there are strong trends in some of these relationships, especially the noncompensation ones, but also show signs that there may be cyclical impacts as well. Is it possible to use the regressions to isolate the impact of the cyclical changes in GDP on the movements of small business GDP relative to large business from the other changes?

To try to isolate those changes, regressions for the industry, small business, and large business components (fit over the 1977-1999 time period, and shown in Appendix C) were used to simulate the movement in small and large business GDP (and its sub-components) for given changes in overall private nonfarm GDP (and its sub-components). To look at the cyclically-related impacts, the ratio of small business to large business for each industry is calculated first for a baseline, and then with an artificial cycle superimposed over the baseline

figures. The two sets of ratios are compared to show up the cyclical differences. The artificial cycle is used as a method of amplifying and exaggerating the swings in GDP to provide a more pronounced picture of the movements in small versus large business.

Because a baseline is needed for comparison purposes for this analysis, the actual historical percentage changes for the 1986-1997 period were used as that baseline.[23] The artificial cycle was centered on the last recession covered by these data, 1990-1991. Two different cycles were run. The first cyclical pattern was an exaggerated cyclical pattern. That pattern consisted of adding the following percentage changes 4,2,-2,-4,-4,-2,2,4,0,0,0 to the baseline private nonfarm GDP numbers. Thus, 1986 was the starting point, then for 1987 an extra 4 percent was added to the actual percentage change in GDP for that year, and in 1988 an extra 2 percent was added to the actual percentage change in that year, etc. This exaggerated cycle was used to look at the patterns generated by GDP and its two major components. Table 4 shows the actual changes used for the baseline and the cyclical changes for each scenario.

Table 4: Growth Assumptions Used for Cycle to Base Analysis
(Percentage changes in current dollar estimates of GDP)

	GDP	GDP		GDP	
	Baseline	Cycle 1		Cycle 2	
1986 (t-5)	4.7	0.0	4.7	0.0	4.7
1987 (t-4)	7.7	4.0	11.7	1.0	8.7
1988 (t-3)	9.2	2.0	11.2	2.0	11.2
1989 (t-2)	5.8	-2.0	3.8	0.0	5.8
1990 (t-1)	5.1	-4.0	1.1	-1.0	4.1
1991 (trough)	2.9	-4.0	-1.1	-2.0	0.9
1992 (t+1)	5.3	-2.0	3.3	-1.0	4.3
1993 (t+2)	5.3	2.0	7.3	0.0	5.3
1994 (t+3)	6.8	4.0	10.8	1.0	7.8
1995 (t+4)	6.0	0.0	6.0	0.0	6.0
1996 (t+5)	5.7	0.0	5.7	0.0	5.7
1997 (t+6)	7.2	0.0	7.2	0.0	7.2

To identify the changes that can be attributed to cyclical fluctuations, the industry, small business, and large business numbers were calculated from the regressions by inputting

[23] The choice of the baseline does not seem to affect the results of this analysis significantly. Different baselines were tested and the results were nearly identical in each case.

the percentage change in private nonfarm GDP, for each year of the baseline scenario, into the industry equations. The resulting percentage changes in the industry values were then used as inputs to the small and large business regressions. Then the cyclically enhanced GDP values were fed through the equations and the industry, small business, and large business results were calculated for the exaggerated cycle. The ratio of small to large business is calculated for the baseline scenario and the cyclically enhanced scenario. Finally, two sets of small to large business ratios were compared by dividing the ratio of the cycle scenario by the ratio of the baseline. When the value of the resulting variable is rising, it indicates that the small business component is doing better, relative to the large business component, than it did under the baseline scenario. When the variable is declining, it means that growth in large business is outpacing that of small business as compared to the baseline results.

Comparative ratios for GDP, and its two major components, are shown in Chart 6 for each industry. A few generalizations can be made across all industries. For example, the compensation wave pattern tends to be much more subdued than the noncompensation wave pattern. Looking at Chart 4, it is clear that compensation shows a relatively smooth relationship between small and large businesses. The changes most likely related to the cycle tend to be a relative flattening during the recession periods, not showing any sharp up or down movements. Consequently, it is not surprising that there appears to be less of a cyclical component to these relationships.

The larger movements are related to the noncompensation components. However, those vary considerably by industry. Some industries, such as trade and FIRE, show very little difference between large and small business based on the changes in the exaggerated cycle. The wave patterns in those industries tend to be relatively flat for compensation and noncompensation.

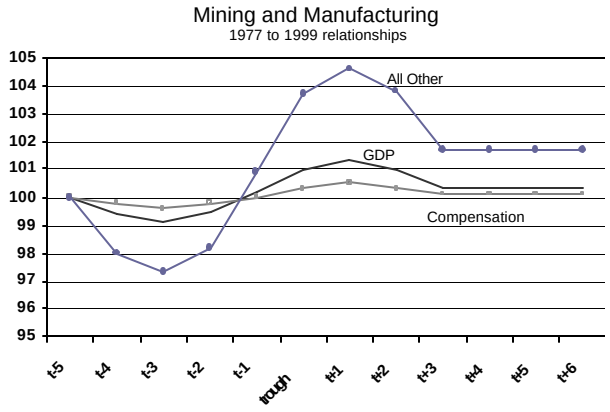
The volatility in the total, as well as the shape of the wave, tends to come from the noncompensation components.[24] Since noncompensation is the component that contains profit-type income, that outcome is not unexpected. As can be seen in Charts 7 and 8, which

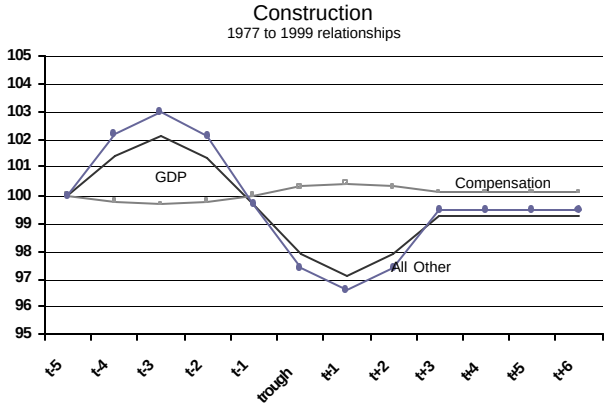
[24] Services is the exception, its GDP wave and its compensation wave are nearly identical. It would be helpful to be able to analyze services on a NAICS basis. The greater industrial detail available under that classification system would provide a better understanding of these results.

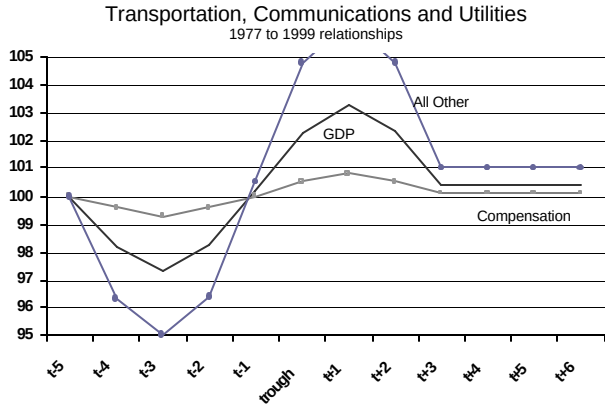
show the percentage changes in compensation compared to the profit-type income components for each business size, the latter are much more volatile than the former. Comparing Chart 7 to Chart 8 also indicates that small business corporate profits are about as volatile as large business corporate profits. However, the profit-type income of noncorporate entities tends to be quite a bit less volatile. That undoubtedly reflects the fact that proprietor's profit-type income is a combination of wages and a return to capital. Consequently, this component tends to fall between compensation and corporate profits in terms of volatility. In the calculation of large and small business GDP, proprietors' profit-type income as well as corporate profits are included in the noncompensation component.

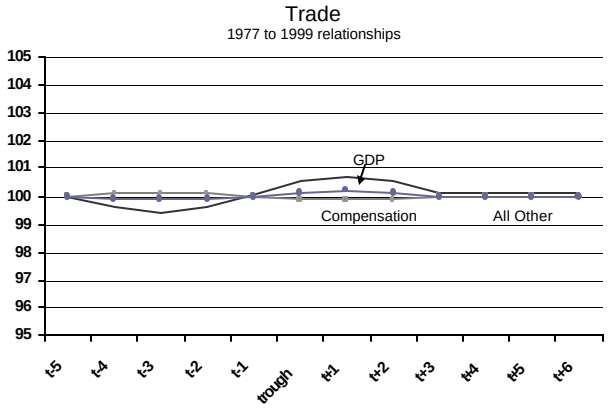
There is more than one wave pattern present in the industry results presented in Chart 6, even if one discounts the industries where the cyclical differences between large and small business appear to be minimal. Construction shows a wave pattern that differs from that of mining and manufacturing, and TCPU. This is because the construction industry is the only one in which the small business slope coefficient is substantially larger than the large business slope coefficient.

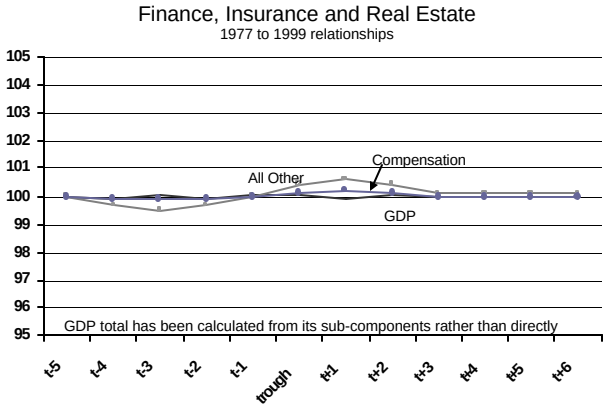
Chart 6: Ratio of Small Business to Large Business--Cycle to Base Comparison by Industry
(based on 1977- 1999 regression relationships)

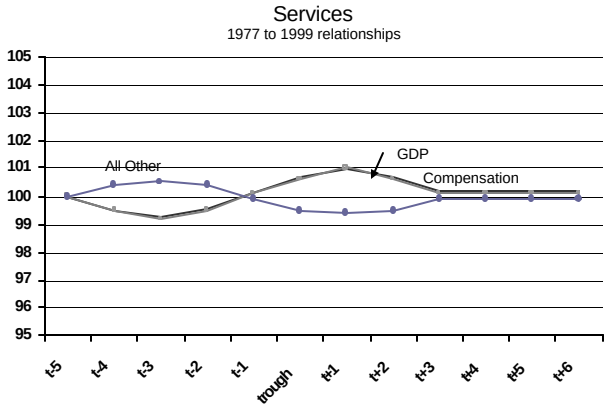












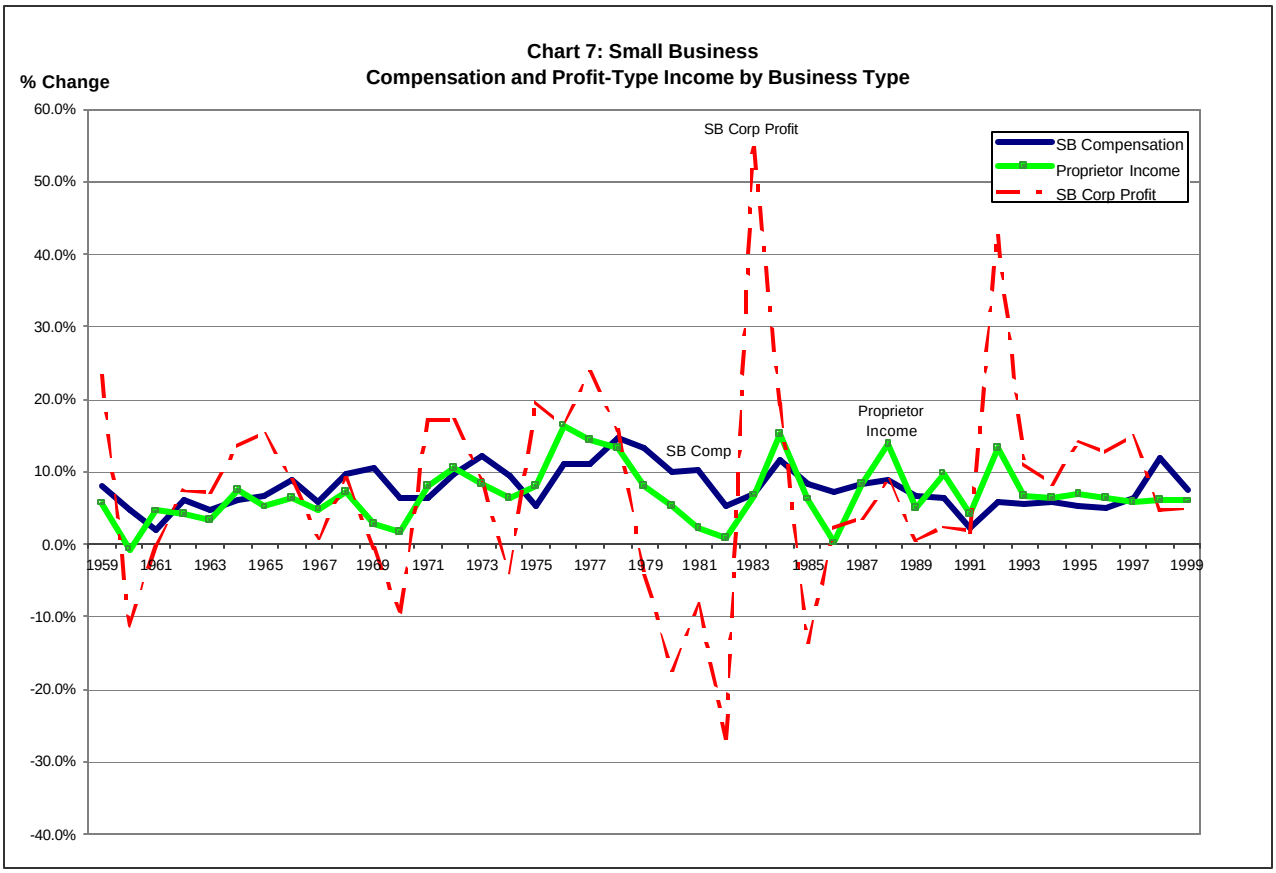


Chart 7: Small Business
Compensation and Profit-Type Income by Business Type
% Change
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
-10.0%
-20.0%
-30.0%
-40.0%
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
SB Corp Profit
SB Compensation
Proprietor Income
SB Corp Profit
SB Comp
Proprietor
Income

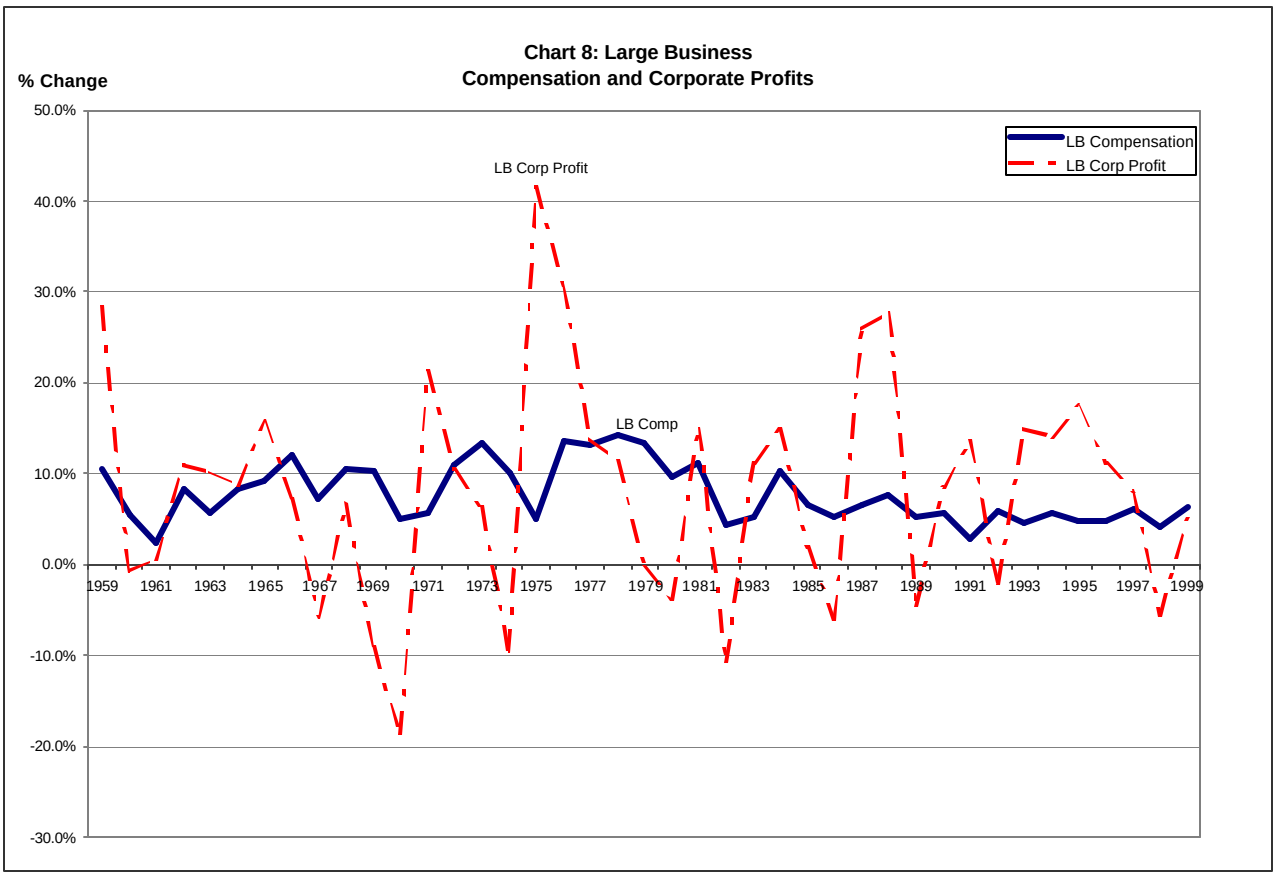
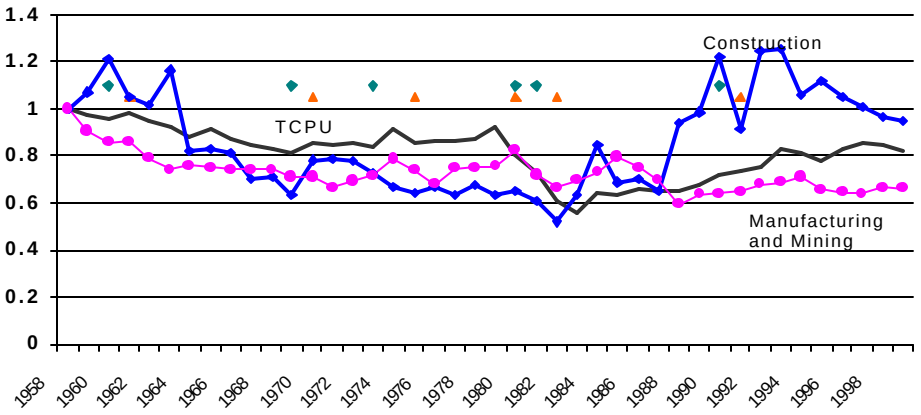


Chart 8: Large Business
Compensation and Corporate Profits
% Change
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
-10.0%
-20.0%
-30.0%
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
LB Corp Profit
LB Compensation
LB Corp Profit
LB Comp

Charts 9 and 10 look at the ratio of small business noncompensation to large business noncompensation for the industries with relatively large waves (Chart 9) compared to those with relatively small waves (Chart 10). The business cycle peaks and troughs are also noted

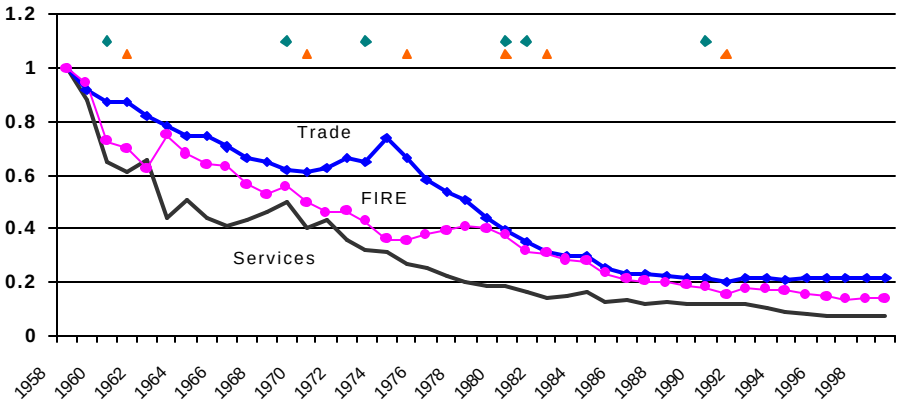
Chart 9: Small Business to Large Business Noncompensation for TCPU, Construction and Manufacturing and Mining



on the charts. The small wave industries, in Chart 10, all tend to have significant long-run trends in this ratio, and the cyclical movements tend to be relatively small compared to those trends. Whereas the larger wave industries, shown in Chart 9, tend to have less of a trend, and especially in the case of construction, a fair amount of volatility from one time period to the next. Looking at Charts 9 and 10 also makes it clear that the ratio plotted in Chart 5, the small business to large business noncompensation ratio for all of private nonfarm GDP, is reflecting a combination of the "trend" industries and the more cyclically sensitive industries.

Construction is the only industry in which the change in the small business to large business ratio seems to show a regular, noticeable decline during virtually all trough periods. The other two industries on Chart 9 do not show a consistent relationship at each trough period. Manufacturing/mining does tend to show a relatively consistent pattern during the periods between troughs, at least during the early part of the period. While the industries on Chart 10 all show noticeable long-term trends, they also show more volatility at the beginning of the period compared to the end of the period. This explains part of the reason that the

Chart 10: Small Business to Large Business Noncompensation for Services, Trade and FIRE



relationships for the later time period regressions are different from those for the full time period. In fact, those differences can cause a change in the wave pattern completely. If one were to look at the regressions based only on the 1983-1999 period for this analysis, the wave pattern in TCPU would tend to look more like construction, FIRE would generate a wave pattern with a larger magnitude than it does in Chart 6, and services flattens out almost entirely.[25] However, as was mentioned earlier, the 1983-1999 time period contains only one cycle; therefore, it is difficult to determine if those relationships are a better measure of the relative impact of the cycle on small and large businesses.

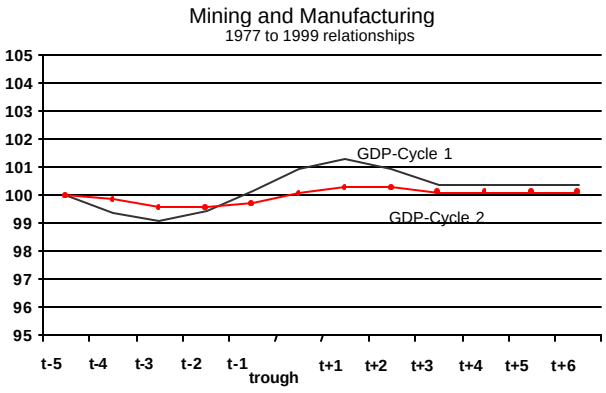
One last set of simulated relationships will be examined. Cycle 1, the exaggerated cycle, amplifies the cyclical swings significantly. While this allows a comparison of the potential impacts across industries and components, it contains too long, and too strong a negative time period compared to what would be experienced in the normal course of cyclical swings. Luckily, in real world experience, downturns tend to be relatively infrequent and relatively short. Therefore a second, more dampened artificial cycle was also tested. That cyclical pattern was 0,1,2,0,-1,-2,-1,0,1,0,0,0. (The GDP numbers for the baseline and the cycle can be seen in Table 4 above.) The next set of graphs, shown on Chart 11, examine the GDP line from Chart 6, compared to the GDP ratio generated by Cycle 2. As expected, the

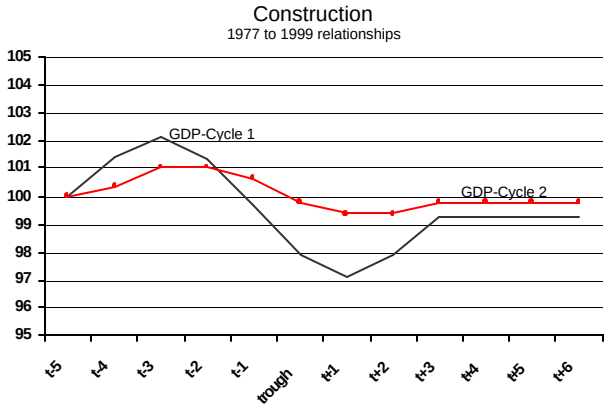
[25] FIRE GDP in Chart 6 is being generated by adding together the results of the two components rather than being generated directly from the GDP regression. That is because the components show a different wave trend than does the GDP variable when calculated directly. Since it is unreasonable to expect that, separately, the components would behave differently from their sum, the GDP variable is generated from its parts.

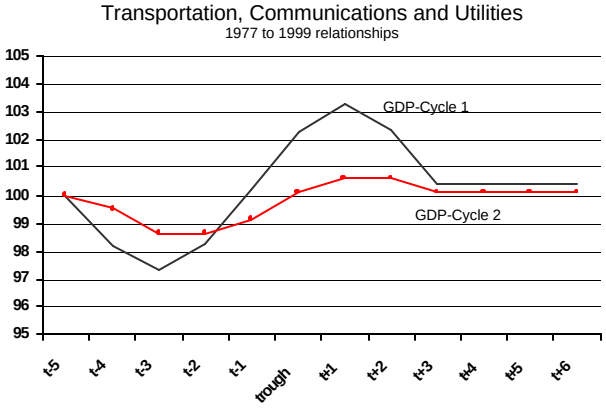
Cycle 2 waves are all flatter than the Cycle 1 waves; however, they generally maintain the same shape. Since the shape is being determined by the regression coefficients and, like the simulations done for Chart 6, these simulations use the regressions estimated for the 1977-1999 period, that is not an unexpected result. The more subdued cycle means that even industries with relatively pronounced differences in the small business to large business relationships do not show substantial deviations in the growth rates of the two business sizes.

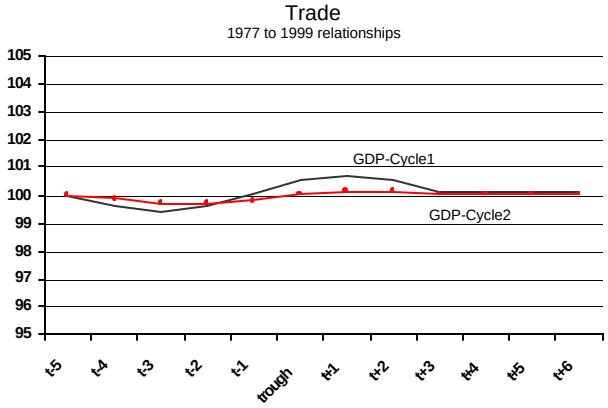
These simulations do provide some basis for suggesting that small and large businesses show different patterns of movement during a business cycle. However, the sensitivity appears to be limited to a few industries. The patterns are not the same in all industries and can change over time. Where there do appear to be cyclical impacts, they seem to be most related to the relative movements in the noncompensation components of the two business size measures, probably in the relative movement in profits and profit-type income.

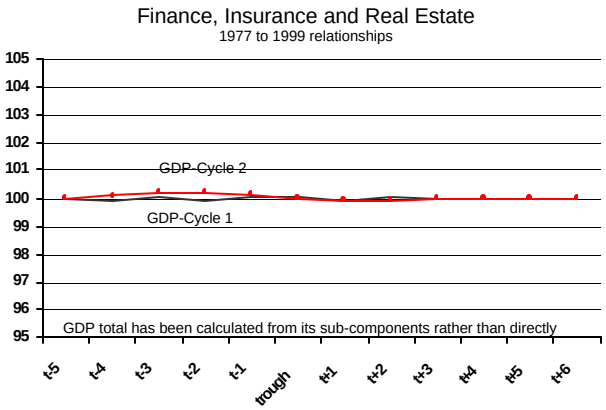
Chart 11: Small to Large Business GDP—Cycle to Base Comparison— Cycle 1 vs. Cycle 2
(based on 1977- 1999 regression relationships)

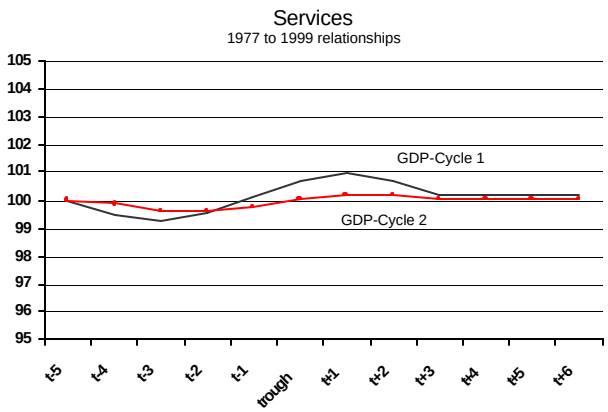








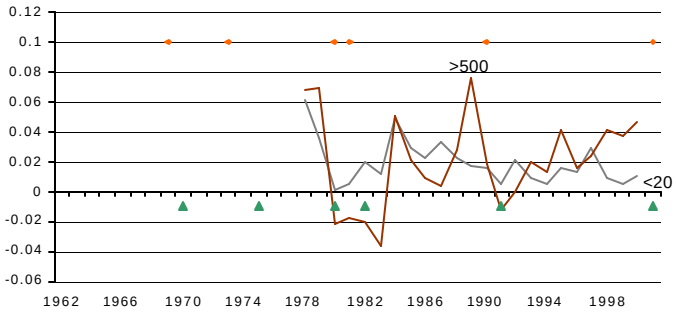




Employment by Business Size During the Cycle

Small business GDP data are the only long-term series providing a dollar measure of small business output. However, there are a few other indicators of small business activity that can be looked at to analyze cyclical changes. One obvious indicator of cyclical changes in the economy is employment. In fact, the methodology of the Business Cycle Dating Committee makes employment an excellent indicator of peaks and troughs in economic activity. Unfortunately, there is no measure of monthly or quarterly employment by business size. If there were, it would provide a basis for analyzing changes in activities by business size during the cycle in general; but, it would be particularly helpful in analyzing the downturns in more detail. However, annual measures of small business employment are the only ones available.[26] In Chart 12, two measures of business size employment from County Business Patterns (CBP) were examined as indicators of changes at both ends of the business size spectrum. The percentage changes in employment in establishments with fewer than 20

Chart 12: Annual Percent Change in Employment of Establishments with Fewer than 20 employees and more than 500 employees



employees were compared with percentage changes in employment in establishments with more than 500 employees. While the former group may not all be small businesses (since large businesses could have establishments with fewer than 20 employees), it is probably very representative of the smaller companies. The latter group will all be large businesses. The

[26] While the Statistics of U.S. Businesses probably provides a better annual measure of small and large business employment, those data do not go back far enough to look at the impacts over more than one cycle.

chart shows similar patterns around the troughs, slower growth in employment for the small establishments, and at times, actual declines in employment for the large establishments. Both groups also tend to show their largest percentage increases in employment somewhat before the peak in the cycle. The extra volatility in the large business group might make one believe that large businesses overall have more volatile employment. However, there may be several establishments in the 500+ employee group at the top of the expansion that drop down into a group with fewer employees during a recession. Whereas, establishments with fewer than 20 employees will usually stay in that group during a recession unless the business closes. (Although some establishments might move up to a group with more employees in expansionary times.) This type of movement by establishments between groups would tend to make the 500+ group more volatile. Plus, any large plant closures in this group will tend to result in a noticeable percentage change in total employment because of the large size of each single establishment. Whereas individual business closures among the smaller group probably have less of an impact on the total percentage change. Nevertheless, the pattern of the two groups is very similar during the cyclical changes in the economy.

Chart 13: Annual Percent Change in Employment of Establishments with Fewer than 20 Employees, Fewer than 50 Employees and in Total Employment

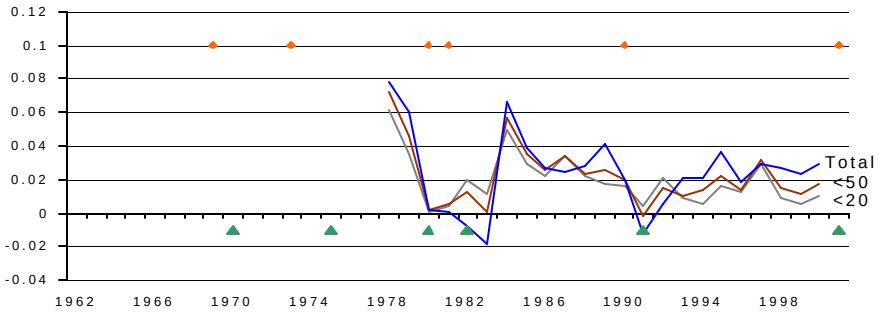


Chart 13 looks at the percentage changes in employment in two small-business related groups against the percentage changes in total employment. The first business size group is the less than 20-employee group, examined above, and the second is the less than 50-employee group. This second group includes the first group but adds the employment from

establishments having 20-49 employees to them. The patterns of the two groups are very similar. Although the smaller business sizes do not seem to show declines in employment during the downturns, they do show periods of no employment change at the troughs. Total employment does sometimes decline. This pattern may indicate that small businesses are more likely to hoard employees during a downturn than larger businesses, rather than go to the expense of hiring and retraining when times improve. However, it undoubtedly is also showing the impact of larger establishments shrinking enough to be classified into the smaller size group. That masks some of the employment losses that are taking place when the smallest companies shrink or close.

Small business employment also was examined with respect to the sub-category of small business GDP to which it should be most closely related, compensation. The relationship was relatively strong.[27] Two measures of small business employment from County Business Patterns (CBP) were tested as explanatory variables for compensation. The percentage change in employment in establishments with fewer than 99 employees, and the percentage change in establishments with fewer than 20 employees were each used to explain the percentage change in private nonfarm small business compensation. The following results were obtained for the 1984-1999 time period:

$$\text{Private nonfarm SB compensation} = .041 + 1.08 \times \text{CBP employment}_{<99} + .05\ \text{Dummy}_{1998}$$
$$\text{R-square} = 0.8 \qquad (8.6) \quad (5.4) \qquad (5.6)$$

$$\text{Private nonfarm SB compensation} = .045 + 1.025 \times \text{CBP employment}_{<20} + .05\ \text{Dummy}_{1998}$$
$$\text{R-square} = 0.6 \qquad (6.4) \quad (2.9) \qquad (4.3)$$

The results indicate that an increase of 1 percent in employment for the establishments with fewer than 99 employees results in a 1.08 percent increase in small business compensation. However, it also indicates a relatively large trend variable of about 4 percent per year. The relationship between small business compensation and employment growth in the smallest establishments shows very similar results. However, the relationship is not quite as strong, explaining 60 percent of the variation in the small business compensation variable rather than the 80 percent explained by the larger employment group. This is not surprising since changes

[27] The source of the employment data was *County Business Patterns*, only employment by employers were included, self-employed were not.

in compensation will be more closely tied to the employment measure that best matches its underlying definition.

While it is reasonable to assume that changes in employment will be closely linked to changes in payroll, one might also ask if changes in GDP can provide information about the changes in employment, especially for the very smallest firms. The first test was the relationship between employment growth in the establishments with fewer than 20 employees and the changes in small business GDP. That relationship was not a strong one. Each one percent change in small business GDP generated about a third of a percent in the employment for this size group. However, the equation's fit was relatively poor, explaining only about 30 percent of the variation in the employment series. Experiments using the "real" value of small business GDP, and the profit-type income of noncorporate businesses as explanatory variables did not generate better results.

The relationship between the percent change in the number of self-employed individuals and the percent change in small business GDP was also not strong. Nor, interestingly, was the relationship between the percentage change in the number of self-employed and the percentage change in proprietors' income. The cyclical pattern of changes in self-employment is not obvious. Self-employment tends to grow during years coinciding with the trough of a recession. That undoubtedly reflects self-employment as an option to unemployment during periods of poor business conditions. However, during periods of strong GDP growth, self-employment sometimes increases and sometimes decreases. This reflects two forces as work. Strong growth periods provide favorable conditions for entrepreneurs to start small businesses. But, strong growth periods also provide more opportunities for alternative employment. The GDP by business size data do not provide the necessary information to determine the set of circumstances triggering a specific direction of change in self-employment.

Cyclical Indexes and Indicators and Small Business

As was mentioned earlier, one problem with looking at the cyclical aspects of small businesses is that most of the small business-related data are annual. To examine cyclical

downturns, in particular, it is necessary to have data of a higher frequency than annual data. Additionally, it was thought that some analysis of potential indicators of small business' current position vis-à-vis a cycle might be helpful. The Conference Board combines a wide range of economic data each month to estimate its set of Leading, Lagging and Coincident Indicators which provide a metric that can be used to gauge the current position of the entire U.S. economy vis-à-vis the business cycle. Would a similar collection of information about small businesses provide a more frequent indicator of its position? Unfortunately, the lack of monthly or quarterly data on small businesses prevent the direct compilation of small business data into a set of indicators similar to those produced by the Conference Board. While it might be interesting to determine if there is a set of macroeconomic data that could be used to construct such a set of indicators for small business, that was beyond the scope of this project. Consequently, a source of small business survey data that might be used to provide some basis for a cyclical indicator were investigated.

To this end, JPC examined the National Federation of Independent Business' (NFIB) quarterly survey of small businesses as a possible source of higher frequency data that might be used to provide insights on the cyclical nature of small business activity. This is a survey of NFIB members, a subset of all small businesses, and has been conducted every quarter since October 1973 (monthly since 1986.) The quarterly surveys, conducted every January, April, July, and October, have larger sample sizes than the monthly surveys (about 2,000 from 1973 to 1994 and near 1,500 since 1995) and provide the longest continuous time series for most questions.

The NFIB data, because they are specific to small businesses, were tested as to their ability to provide insights into small business GDP data. Since the NFIB data are available quarterly and the small business GDP data are produced with a time lag, a relationship-if it were found-could prove useful in providing more timely information about small business GDP growth. The NFIB's Index of Small Business Optimism (ISBO) is based on an average of 10 seasonally adjusted series derived from the NFIB survey. The average of those series plus 100 yields the ISBO.[28]

[28] The series in the ISBO are as follows: Net percent planning to increase employment, percent with at least one hard-to-fill job opening, net percent expecting credit conditions to get better, net percent expecting the economy

Possible relationships between the NFIB data and GDP for small business were analyzed. It was necessary to do these on an annual basis due to the annual nature of the small business GDP data. Although any relationships that are found could then use the quarterly data, as they become available, to approximate the next annual number. A range of NFIB indicators were regressed on annual percentage changes in real small business GDP over the 1973 to 1998. Of the various regressions estimated, the following variables were found to display a sound relationship with percentage changes in small business GDP (t-statistics in parentheses):

$$SBGDP_t = 8.95 + 0.156 \times EXPNDNOW_t \text{ ; R-squared = 0.720}$$
$$(10.80) \quad (7.68)$$

$$SBGDP_t = 6.58 - 0.221 \times LOANSHARD_t \text{ ; R-squared = 0.381}$$
$$(6.30) \quad (-3.76)$$

$$SBGDP_t = 7.78 - 0.668 \times CREDHARD_{t-1} \text{ ; R-squared = 0.635}$$
$$(9.45) \quad (-6.19)$$

where,
SBGDP = annual percentage change in small business GDP,
EXPNDNOW = net percent saying now is a good time to expand,
LOANSHARD = net percent of firms reporting loans harder to get now compared to three months ago,
CREDHARD = same as LOANSHARD but seasonally adjusted.

In two out of three cases, the relationships are coincidental. In the case of CREDHARD, the best fits are obtained with a one-period lag. Overall, it appears that harder credit conditions are associated with reductions in the percentage change in small business GDP, either in the same period or the next period.

The ISBO and the alternative aggregate indicators calculated from the ISBO components are also highly correlated with the annual percentage changes in small business

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to improve over next six months, net percent expecting higher real sales over next six months, net percent reporting higher profits over last three months, net percent reporting inventories too low, net percent planning to increase inventory stocks, net percent saying now is a good time to expand, and net percent planning capital expenditures over next six months. All series are seasonally adjusted.

GDP.[29] The regressions suggest the relationships are coincidental as lead and lag values lead to worse fits. The results are as follows (t-statistics in parentheses):

$$SBGDP_t = -61.57 + 0.655*ISBO_t \text{ ; R-squared = 0.572}$$
$$\quad\quad\quad\quad (-5.27) \quad (5.54)$$

$$SBGDP_t = -40.53 + 0.441*INDEX1_t \text{ ; R-squared = 0.669}$$
$$\quad\quad\quad\quad (-6.32) \quad (6.82)$$

$$SBGDP_t = -47.37 + 0.511*INDEX2_t \text{ ; R-squared = 0.661}$$
$$\quad\quad\quad\quad (-5.82) \quad (6.25)$$

At least in terms of R-squared, it appears that the alternative indexes are better indicators of changes in small business GDP than the Index of Small Business Optimism. The regressions can be used to derive the values of the NFIB indexes that are associated with zero percentage change in small business GDP. Those values are as follows: for ISBO the level is 103, for INDEX1 it is 106, and for INDEX2 it is 103.[30] In summary, the evidence suggests that values of NFIB indicators in the range of 100 to 105 are associated with positive changes in small business GDP and values below 100 are generally indicative of reductions in small business GDP.

The NFIB series were also examined with respect to other commonly consulted cyclical indicators such as the leading and coincident indexes of The Conference Board and the Purchasing Manager's Index. However, the small business survey data for the most part do not show significantly different results from the trends available in the more general cyclical indexes. One comparison looked at how the ISBO might match the Purchasing Manager's Index (PMI) published by the Institute for Supply Management, which until recently was

[29] Because of the differences between the ISBO and PMI JPC constructed indexes from the NFIB data that would serve as better approximations of indexes that could be derived from the ISM data. A limitation of the NFIB survey is that data on the four series that may be used to approximate the PMI are not simultaneously available for the entire period since 1973. Therefore, depending upon the availability of data, three alternative indexes were constructed to match the PMI. Those are as follows:

INDEX1: This spans the 1973 to 2002 period and includes two data series – net percent expecting higher real sales volumes over next six months, and net percent reporting higher sales volume over last three months. Both series are seasonally adjusted.

INDEX2: This covers the 1976 to 2002 period and, in addition to the two series in INDEX1, includes net percent of firms increasing employment over the past three months.

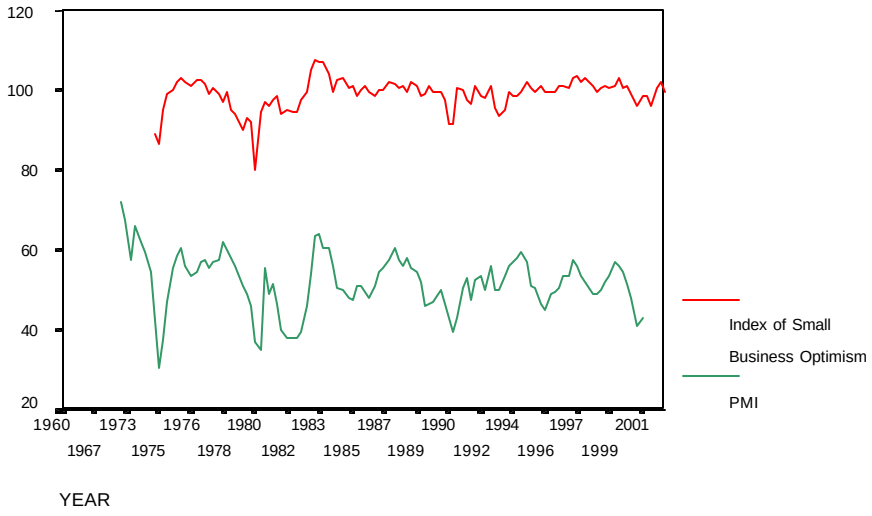
[30] The indexes are all expressed relative to 1986, i.e. 1986 = 100. Therefore, an adjustment must be made for this feature to derive index levels that are associated with zero percentage change in small business GDP.

known as the National Association of Purchasing Management (NAPM). The PMI is based on a survey of about 300 purchasing executives in the manufacturing sector.[31]

The PMI is a (subjectively) weighted average of five data series: new orders, production, employment, supplier deliveries, and inventories. Each of the underlying series is first expressed as a "diffusion index." Those indexes are the sum of the percent responding positively to a question (e.g. production was better) plus one-half of the percent reporting no change (e.g. production was same.) The diffusion indexes are then seasonally adjusted and a weighted average is taken to yield the PMI. It is considered a lead indicator of GNP. The PMI ranges from 0 to 100 with a level around 50 indicating no change in economic activity and above 50 indicating economic expansion. Research shows that a PMI of around 44 is associated with 0 percent change in GNP.

Trends in the Index of Small Business Optimism (ISBO) and the PMI are shown in Chart 14. Despite their very different origins, the two indices are not dissimilar in the broad

Chart 14: The Index of Small Business Optimism and the Purchasing Managers Index



Source: NFIB and Institute for Supply Management.

[31] Known as the Business Survey Committee, members report monthly on changes, over the previous month, in production, new orders, prices, inventories, supplier deliveries, employment, and new export orders (since 1988.) Monthly data on the PMI is available starting from 1948. In 1998 the ISM surveys were extended to encompass the non-manufacturing sectors. However, those data, i.e. a non-manufacturing PMI, are not yet available.

sense. By design, the ISBO is centered around 100 and the PMI around 50. The PMI shows a greater amount of fluctuation but that may reflect its coverage of the manufacturing sector only. Further, the PMI is an average of only half as many data series as the ISBO. Both indexes show troughs on and about the recessions of 1974, 1980, and 1991. Following the recessions, both indexes reveal upward trends.

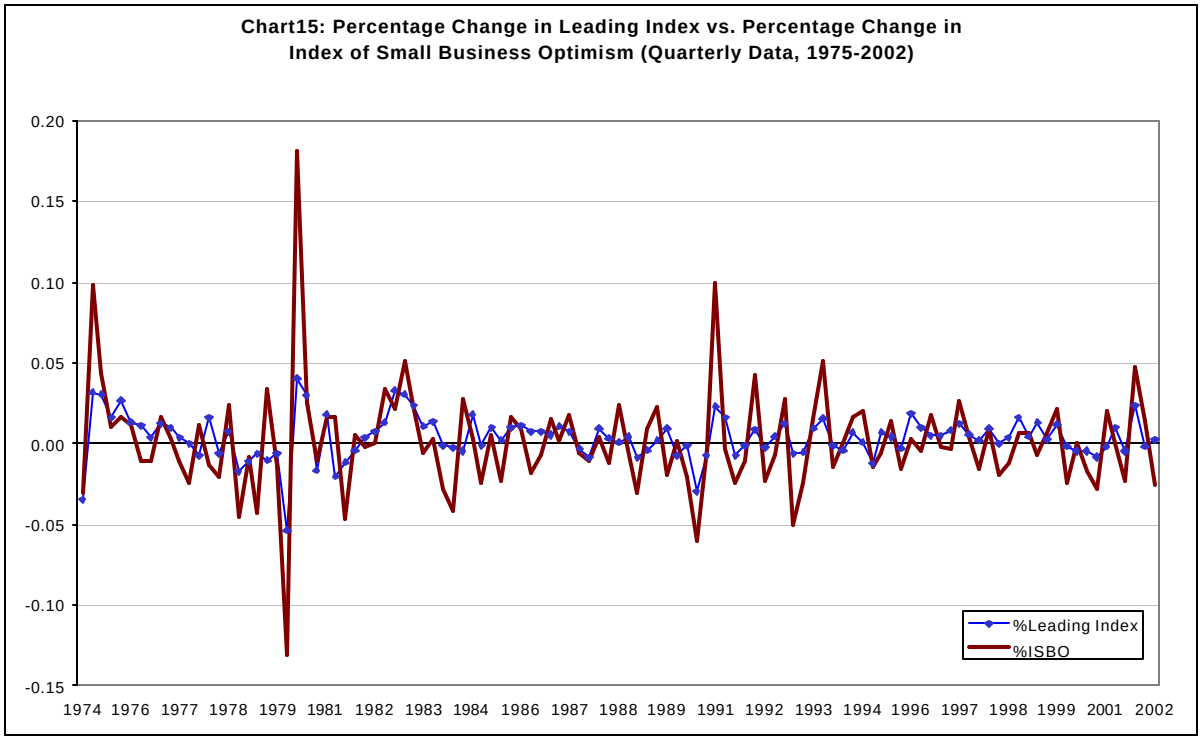
Some of the NFIB survey data results were also compared to the leading and coincident indexes produced by The Conference Board. Unlike the NFIB indexes, which are produced from responses to a survey questionnaire, The Conference Board indexes are produced by weighting together various statistical series. The leading index is a composite of ten indexes. Some of those, such as money supply (M2), have a time trend component, but many, such as the index of consumer expectations, are free of a time trend. Thus, the leading index probably has a weak inherent time trend. The coincident index has four components based on trends in employment, income, production, and sales. Thus, the coincident index can be expected to have a fairly strong time trend. That trend is eliminated by analyzing the coincident index in the first difference or percentage change forms. The NFIB indexes have no time trend.

The relationship between the NFIB and Conference Board indexes was examined by means of OLS regressions. *A priori*, it is not clear which of the two sets of indicators should serve as the "predictor". Therefore, the regressions were estimated both ways, i.e. by first using the NFIB indicators as the independent variables and then using The Conference Board indexes as the independent variables.[32]

The leading index was regressed against the NFIB indexes in several different forms. The best results were obtained when both sets of indexes were expressed in either one-period change or percentage change form. Those results are shown below (t-statistics in parentheses):

$$\%\Delta ISBO_t = -0.0056 + 1.752*\%\Delta LEADINDEX_t;\ \text{R-squared} = 0.508$$
$$\qquad\qquad\qquad\quad (-2.41)\ \ (10.60)$$

[32] The results were much better using the quarterly data (i.e. the data for the months of January, April, July, and October) than the monthly data. That is most likely a reflection of the fact that the NFIB samples for the "off" months are quite small and subject to high variance. Therefore, only the results based on the quarterly data are reported.



With the left-hand and right-hand side variables switched, the results are as follows:

$$\%\Delta LEADINDEX_t = \underset{(4.0)}{0.0036} + \underset{(10.60)}{0.290}*\%\Delta ISBO_t;\ \text{R-squared} = 0.508$$

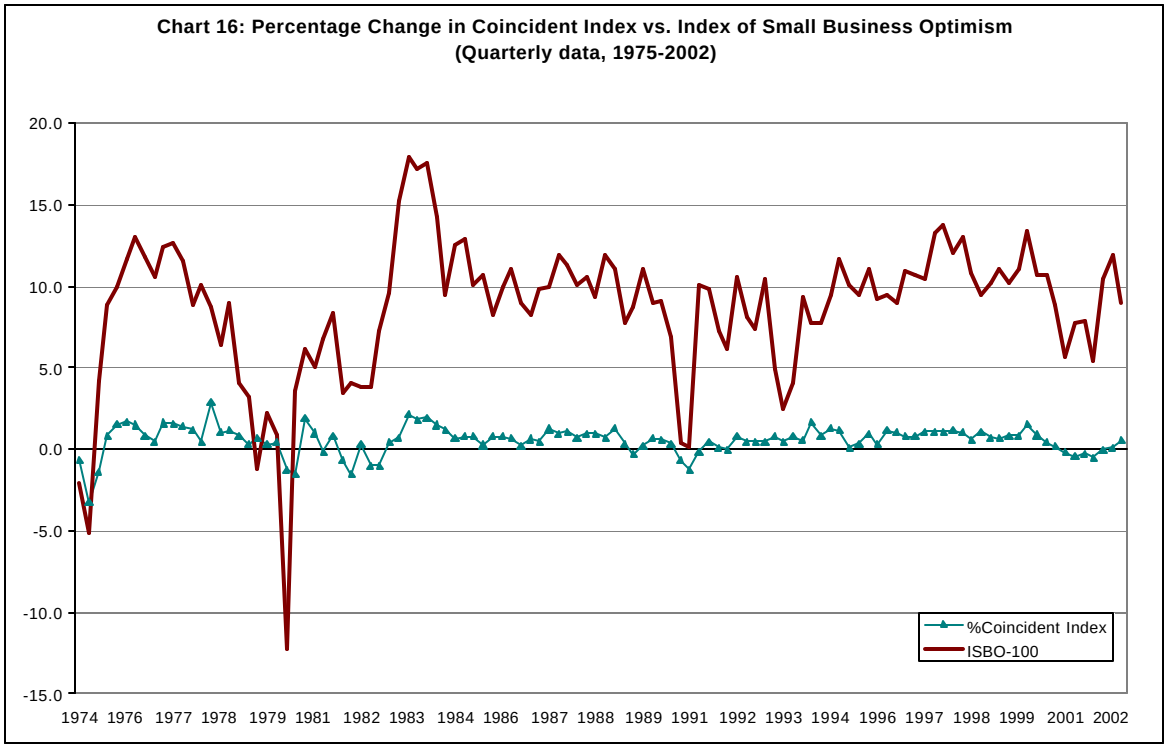
The regressions above show that modest positive change in the leading index is associated with a flat ISBO. Alternatively, if the leading index is unchanged, small business optimism turns negative. Overall, the ISBO shows much larger swings than the leading index. The slope coefficient of 1.752 in the first regression is the "elasticity" of change and indicates that each percentage change in the leading index is correlated with nearly double that amount of change in the ISBO. That can be confirmed visually by looking at Chart 15.

As with the leading index, a number of different forms of the NFIB indexes were correlated with a number of variations of the coincident indexes. The strongest relationships were between the NFIB indexes and one-period changes in the coincident index. With the coincident index expressed in percentage change form the results are as follows:

$$ISBO_t = \underset{(284.90)}{106.74} + \underset{(9.12)}{335.32}*\%\Delta COINDEX_t;\ \text{R-squared} = 0.431$$

With the left-hand and right-hand side variables switched, the results are as follows:

$$\%\Delta COINDEX_t = -0.134 + 0.001*ISBO_t;\ R\text{-squared} = 0.431$$
$$(-8.75)\ \ (9.12)$$



The regressions between the coincident index and ISBO (with the coincident index as the independent variable) reveal that a level of 106 for the ISBO corresponds with an unchanging coincident index. If a flat coincident index is associated with no change in GDP, this finding is consistent with the direct relationship between the ISBO and small business GDP that was discussed above. While such relationships may not provide a significant insight into the cyclical behavior of small businesses, they do indicate that the NFIB survey information might provide some useful information as one of a set of cyclical indicators.

Conclusions

Given the lack of monthly or quarterly data for small businesses, it is not possible to do a complete comparative analysis of small versus large business activity during the cycles in the economy. Over the four decades of this analysis, a large number of different forces

have influenced business size GDP. That makes it difficult to isolate the changes in business size relationships that may reflect differences in how those businesses react to the cycle. However, different industries do react differently to cyclical changes. Some of the most cyclically sensitive industries, such as construction, are predominantly small businesses. Services industries, which produce a large proportion of small business GDP, tend to be less sensitive to the cycle than most other sectors. This latter effect may be a result of the rapid trend growth in services masking some of the cyclical patterns. Since downturns tend to increase job destruction more than it slows job creation, that could be one factor in the stability of the service industries. Another factor is that services tied to health care are by their nature less sensitive to the ups and downs of economic activity.

Within the industry sectors, some industries show potential differences in how small businesses and large businesses are impacted by changes in the cycle, and some do not. In construction, small firms tend to be more negatively impacted by downturns than large firms, but do slightly better than large firms during an expansion. Manufacturing/mining, especially the noncompensation component, tends to show the opposite pattern from construction. Small businesses tend to do somewhat better in a downturn than large businesses; but, they do not grow as fast during an expansionary period. TCPU tends to show the same pattern as the manufacturing/mining sector. For the industries that do show some differential impacts, those differences are more noticeable in the noncompensation components. The service sector is an exception. To the extent services shows a differential GDP pattern by business size, it is the same as seen in manufacturing and TCPU. But that pattern seems to be driven by compensation rather than noncompensation. There are also some indications that these relationships may be changing over time. If regressions fit over the 1983-1999 period are used for this analysis, the service industries lose almost all signs of different impacts by business size. However, it is not clear yet whether those are related to cyclical or longer-term changes. In short, it is not possible to make generalized statements about the impact on all small businesses relative to all large businesses of cyclical changes in the economy. In doing such an analysis, other factors should also be considered, especially industry differences.

Appendix A

Cyclical Impacts on Some Aspects of Small Businesses Financing

Financing for small businesses comes from many sources. The Federal Reserve Board's *1998 Survey of Small Business Finances* provides a recent summary. Bank lending is the largest source of funds, but less than 60 percent of small businesses use this type of funding, additionally non-depository institutions provide funds to about one-third of small businesses, with finance companies providing the most funding. Other sources of funding include trade financing such as credit from suppliers, owner's own funds, venture capital and Small Business Investment Companies (SBICs), credit cards, and funds from family and individuals, including the "angel investors". The larger the business, the more likely it is to use bank lending.[33] Firms less than five years of age are more apt to use family and individual funding.[34]

Several studies have looked at the availability of bank credit and funding for small businesses. Few studies have looked at the issue of bank loans on a cyclical basis, or during periods of tight money. A few articles have focused on the "credit crunch" of the early 1990s; although, they often focused on bank behavior in general rather than its impact on loans to small businesses. Hancock and Wilcox (1998) use call report data for the 1989-1992 period to determine that, small banks during this time period, shrank their loan portfolios more than large banks. Despite the fact that large banks tended to increase their loans when the smaller banks were under pressure, the reduction in loans at small banks had a relatively larger impact on economic activity in the area than did declines at large banks. There also was weak evidence, based on model outcomes, that economic activity at small firms was affected more per dollar of loan loss than economic activity at large firms. The article also found that SBA guaranteed loans were not as impacted by the declines in bank capital as other loans. Shrieves and Dahl (1995) looked extensively at the changes in bank lending behavior during the 1990 credit crunch compared to lending behavior during 1985-1989. That study found that banks did change their lending patterns during the 1990 credit crunch when compared to the earlier

[33] "Financial Services Used by Small Business: Evidence from the 1998 Survey of Small Business Finances, *Federal Reserve Bulletin*, April, 2001, p. 183.
[34] Ibid. p.195.

period, and that those changes had a significant negative impact on consumer and commercial loans. However, the study does not examine commercial loans by the size of the company receiving the loan and did not provide significant information about the overall impact on any of the commercial loans.

In general, there is a lack of data with which to examine the cyclical impacts of credit condition on small businesses. The annual and quarterly data on bank loans and financing do not have good indicators showing which of those loans are being made to small businesses. Often it is being assumed that the loans are to small business based on the size of the loan.[35] *The Survey of Small Business Finances*, which extensively examines the use of bank credit and other financing means by small businesses, is done only periodically and therefore does not provide a basis for doing a cyclical analysis of these issues. One of the few sources of long term information on loans with some indication of business size is the Federal Reserve Board's *Flow of Funds*. Those data show annual nonfarm nonfinancial corporate and nonfarm noncorporate loan totals. This does not provide a complete disaggregation of large and small business loans because the corporate loan totals can not be separated into small and large business components.

This appendix looks at the information available on the cyclical behavior of credit and credit conditions by business size. The cyclical pattern of loans is examined using the *Flow of Funds* data mentioned above. In addition, the NFIB's *Small Business Economic Survey* and the *Senior Loan Officer Opinion Survey on Bank Lending Practices* provided some insights about credit conditions and small business' perceptions of credit conditions during different parts of the cycle. Finally, information on the cyclical changes in small business venture capital financing will be discussed briefly with reference to changes in SBIC financing.

Business Borrowing by Size

The Federal Reserve Board's *Flow of Funds* data show loans to nonfinancial corporate businesses and to nonfarm noncorporate businesses. These data are shown in percentage change form for the period 1955 and through 2001. Charts A-1 and A-2 show both total loans

[35] Information collected in connection with the Community Redevelopment Act does have some marginal information about the size of the company receiving the loan for some of its data. However, that information have been available for only a short period of time and is not useful in analyzing longer-term cyclical trends.

and loans excluding mortgage loans for each of these groups of businesses. The marks along the top and bottom of the chart show years in which there were business cycle peaks (along the top) or business cycle troughs (along the bottom). The latest business cycle peak and trough have been placed in 2001. NBER has officially designated March 2001 as the peak but has not officially designated the trough; however, many believe the trough will be designated as being in the fourth quarter of 2001. The loans for both groups follow a very similar cyclical pattern. Increasing during expansions and falling during downturns.

Chart A-1 shows that total noncorporate loans, including a large mortgage component,

Chart A-1: Nonfarm Noncorporate Business

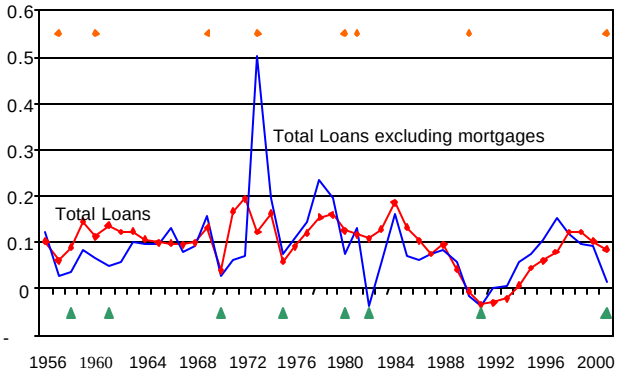
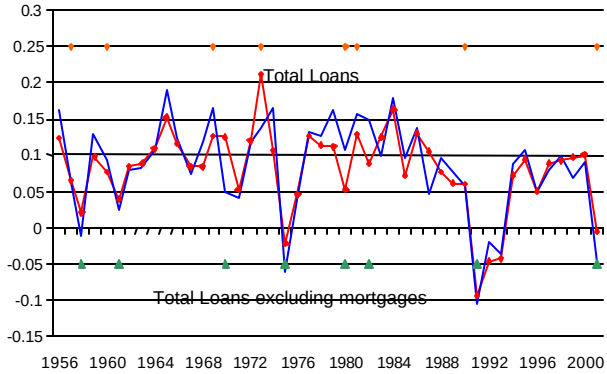


Chart A-2: Nonfarm Nonfinancial Corporate Business



have less volatility during the business cycle than do the loans excluding mortgages. In addition, while the loans almost always show their smallest percentage change at the trough of the business cycle, loan growth often remains positive at that point. In only two recessions do loans excluding mortgages actually decline. Loans including mortgage loans decline only in the 1991 recession. While the largest percentage changes sometimes do come at the top of the business cycle (most notably in 1973), that relationship is not as close as the relationship seen in the downturns. It is not unusual for the largest increases to be seen a few years prior to the peak, such as happened in the latest expansion.

Chart A-2 shows the percentage change in nonfinancial corporate loans. The total loan series and the loans excluding mortgages show nearly identical results for corporate loans.

This is not too surprising since mortgage loans for corporations are generally associated with business property; that may not be true for the noncorporate sector. Again the lowest point for loan growth is usually coincident with the business cycle trough years. However, corporate loans (excluding mortgages) show an absolute decline during four troughs, including 2001. And corporate loans including mortgage loans declined in three of those periods.

Survey Data Indicators of Small Business Credit Conditions

The NFIB's survey data, discussed earlier, could also be used to look at some issues related to credit conditions for small businesses. NFIB's quarterly data were used for this research. Where necessary, weighted averages were taken of the quarterly data to derive annual data series. The questions asked in the survey are generally subjective, e.g. is some condition better or worse compared to the past or is some condition expected to get better or worse some point in the future. The time period reference in the questions is not uniform, but most questions refer to the past or the next three months. The questions asked in the survey can be classified into three general groups:

1) Firm Characteristics: These include questions regarding business organization, major industry, gross sales, number of employees and size of metropolitan area. NFIB did not provide the first two of this list of variables. Note that these indicators cannot be used to classify the other variables in the survey. For example, one cannot determine whether the response to the credit availability questions varied by industry or business organization.
2) Credit Conditions: Questions asked include those on credit availability, interest rate paid, and whether finance is a factor in business-related expectations and decisions.
3) General Business Conditions/Expectations: These are questions relating to sales, prices, wages, inventories, capital expenditures, employment, hiring shortages, etc.

The following charts show trends generated from responses to business-condition and credit-related questions in the NFIB survey. In Chart A-3, the net percent of respondents expecting a better economy in the next six months hits a trough just before and during recessions and trends upwards thereafter. The reason for the pessimistic outlook in the mid-1990s is not clear. Indeed, this pessimism is not reflected in Chart A-4, which shows the trend

in the net percent saying the next three months would be a good time to expand. After reaching a trough in the 1991 recession, the trend is upwards through the rest of the decade.

Chart A-3: Net Percent Expecting Better Economy in Next Six Months

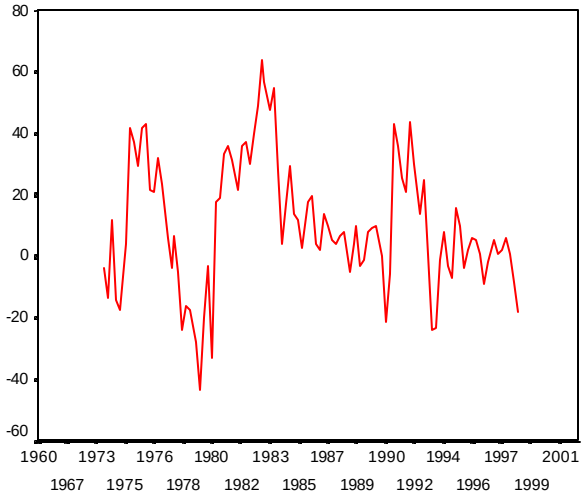


Chart A-4: Net Percent Saying "Good Time to Expand"

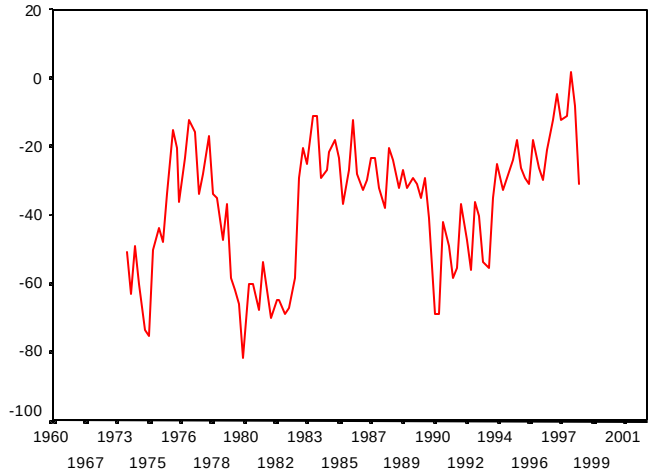


Chart A-5: Percent Saying it is a Good Time to Expand Because of Financing and Interest Rates

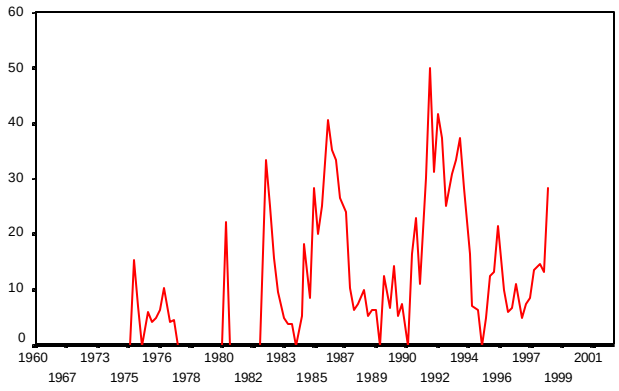
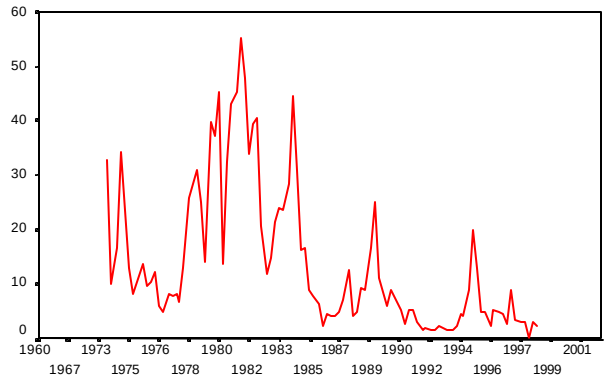


Chart A-6: Percent Saying it is Not a Good Time to Expand Because of Financing and Interest Rates



Source: Derived from NFIB data.

Businesses may respond it is a good time to expand because of an improved outlook with respect to financing and interest rates. This particular factor shows strong peaks immediately following the recessions in the early 1980s and 1990s (see Chart A-5). By 1992, one-half of those who believed it was a good time to expand gave financing and interest rates as the reason for their response. Financing and interest rates could also be a reason why a business thinks it is a bad time to expand. Chart A-6 shows a peak in this factor in the early

1980s and smaller peaks in the early and mid-1990s, with upwards trends revealing themselves immediately prior to the recessions.

Chart A-7 shows the net percent of respondents reporting that loans were harder to get now than three months ago. As expected there are peaks during periods of recessions, and the percent responding "loans are harder to get now" begins to rise just before the recessions. Based on this variable, credit availability does not seem to have been an issue through most of

Chart A-7: Net Percent Saying Loans Harder to Get Now

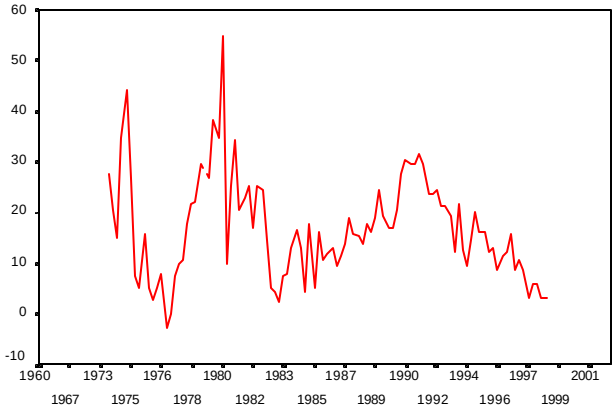
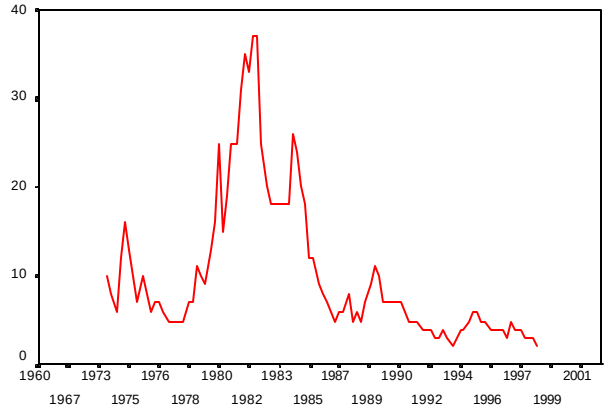


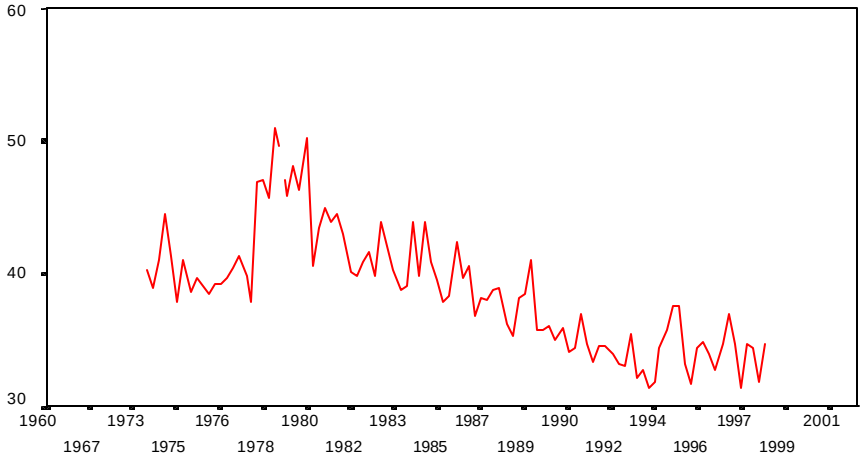
Chart A-8: Percent Saying Financing and Interest Rates are Most Important Problem for Business



previous decade. A similar conclusion emerges when businesses are asked about the most important problem facing them (see Chart A-8). Outside of the first half of the 1980s, financing and interest rates would not appear to have been the primary issue for small businesses.

Chart A-9 shows that the percent of small firms borrowing regularly has declined considerably since the 1980 recession. The percent of small firms borrowing also declined, albeit in a fluctuating manner, from about 1980 to 1994. The trend appears to have leveled out since then. This decline may explain why fewer firms have been mentioning financing and interest rates as the most important problem for their business. The origins of this decline appear to be on the demand side since, except for a brief time around 1990, there appears to be no evidence of a credit crunch between 1980 and 2000.

Chart A-9: Percent of Small Firms Borrowing Regularly



Overall, the NFIB survey of small businesses reveals evidence that credit is harder to obtain during troughs in the business cycles. There is also confirmation of this in the literature. Shrieves and Dahl (1995) note the presence of a credit crunch in 1990. In contrast, using data from the 1987 SSBF, a period just preceding the recession, Levenson and Willard (2000) found no evidence of a credit crunch. Winker (1999) argues that credit rationing is much less likely if current business conditions are good.[36] Unfortunately, there appears to be no study of credit rationing during the 1980-81 time period. Yet, NFIB data clearly indicate that financing problems were at their historical peak during that time period.

Data from the *Survey of Small Business Finance* confirm the decline in small business borrowing. Contrasting data from the 1987 and 1993 SSBF, Cole and Wolken (1996) report a six-point decline in the percent of small businesses using some form of credit (from 60.1 percent in 1987 to 54.1 percent in 1993.) They also report a decline from 44.0 percent to 36.8 percent in the percentage of small firms obtaining credit from banks over the same time period. The downward trend was picked up again in the 1998 SSBF. Analysis of those data by

[36] Ronald Shrieves and Drew Dahl, "Regulation, Recession, and Bank Lending Behavior: The 1990 Credit Crunch," *Journal of Financial Services Research*, Vol. 9, No. 1, March 1995. Alec Levenson and Kristen Willard, "Do Firms Get the Financing They Want? Measuring Credit Rationing Experienced by Small Business in the U.S.," *Small Business Economics*, Vol. 14, No. 2, March 2000. Peter Winker, "Causes and Effects of Financing Constraints at the Firm Level," *Small Business Economics*, Vol. 12, No. 2, March 1999.

Bitler, Robb, and Wolken (2001) indicate a four-point decline in the incidence of credit lines, outstanding loans, and outstanding capital leases between 1993 and 1998.[37]

The reduction in the percent of small firms borrowing regularly was also noted by William Dunkelberg, Chief Economist at NFIB, in testimony to the House Small Business Committee on May 17, 2001.[38] Dunkelberg states that economic growth since 1983, featuring two of the longest expansion in U.S. economic history, has reduced the need for small businesses to borrow for "survival."

An in-depth analysis of this issue would require the development of a model of loan demand by small firms. The model could be tested using the 1987, 1993, and 1998 SSBF. It would also be of interest to study how changes in the composition of small firms may have altered patterns of borrowing and if changes in the regulation of financial markets have had an impact.

Senior Loan Officer Opinion Survey on Bank Lending Practices

The Senior Loan Officers' Survey is conducted quarterly by the Federal Reserve and, among other things, solicits information on changes in bank lending policies towards small firms and medium to large firms. Small firms are defined as firms with less than $50 million in annual sales. The sample consists of loan officers at about 55 large domestic banks and 30 branches of foreign banks. Questions generally pertain to changes over the past three months with respect to lending policies. The three questions relevant for the present study relate to loan standards, the spread of the lending rate over the banks' cost of funds, and the demand for loans. The data are reported as net percents, e.g. percent raising spread in loan rates minus percent lowering the spread. The data series only extend back to 1990. This survey is consistent with the NFIB survey in two key respects: it is conducted in the same months (January, April, July, and October) and it reports net percents in the same fashion.

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[37] Rebel Cole and John Wolken, "Bank and Nonbank Competition for Small Business Credit: Evidence From the 1987 and 1993 National Surveys of Small Business Finances," *Federal Reserve Bulletin*, November 1996. Marianne Bitler, Alicia Robb, and John Wolken, "Financial Services Used by Small Businesses: Evidence From the 1998 Survey of Small Business Finances," *Federal Reserve Bulletin*, April 2001.

[38] The title of his testimony was "Credit Availability and Cost in the Small Business Sector of the U.S. Economy."

Charts A-10 to A-11 show the trends in relevant variables from the Loan Officers' Survey. These data series only begin in 1990 but signs of a credit crunch at that time are evident as there are peaks in the net percent of banks reporting tighter loan standards (Chart A-10) and the net percent reporting an increase in the loan spread (Chart A-11). Loan standards and loan spreads tighten somewhat in the years after 1995. According to the bank loan officers, loan demand from small firms increased following the 1990 recession but held more or less steady thereafter but for a decline in the 2000-2002 period.

Chart A-10: Net Percent of Banks Reporting Tighter Loan Standards for Small Firms

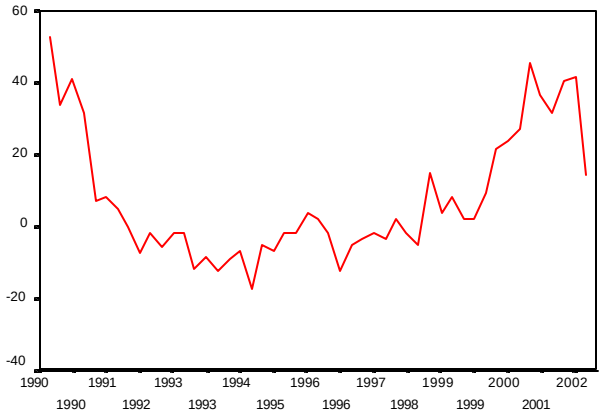
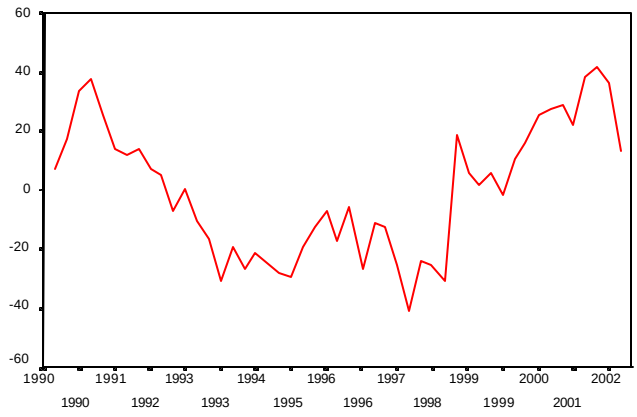


Chart A-11: Net Percent of Banks Reporting an Increase in Loan Spreads for Small Firms



Several regressions were estimated to see if a structural relationship could be determined between the data from the Senior Loan Officers' Survey and the perceptions about economic conditions that are reported in the NFIB survey. Few strong relationships were found in these data. However, a change in loan standards as reported in the Loan Officers' Survey does lead the NFIB indicator about the net percent of firms saying loans are harder to get now. The lead is anywhere from three to six quarters. Starting with no lead, the regression R-squared rises from 0.166 to 0.476 with a three period lead and remains at near that level through a six quarter lead. The coefficients are highly significant throughout. The best fit is with a five period lead and it is as follows (t-statistics in parentheses):[39]

[39] William Dunkelberg reports similar relationships in his testimony before Congress. His analysis uses slightly different constructs of the NFIB variables and he reports a best fit with a six-quarter lead.

$$LOANSHARD_t = 13.98 + 0.322*TGHTSTAND_{t-5}$$; R-squared = 0.480
(13.58) (5.08)

where,
LOANSHARD = net percent of firms reporting loans harder to get now compared to three months ago,
TGHTSTAND = net percent of loan officers reporting tighter loan standards for small firms.

In other words, a tightening of loan standards by commercial banks leads small firms to report a tightening in credit availability three to six quarters later. Interestingly, tighter loan standards are associated with reports of lower interest rates paid by small firms. (This regression has an R-squared of about 0.4 and significant T-statistics on the tighter standards variable.) This result may come about because the tightening of loan standards weeds out the high-risk firms that are more likely to be paying higher interest rates.

The only other regression that shows a strong relationship is that the increases in bank loan spreads manifest themselves in reports of tighter credit conditions by small firms almost immediately. The relationships persist for three to four quarters. The best fit is with a one quarter lag and it looks as follows (t-statistics in parentheses):

$$LOANSHARD_t = 19.57 + 0.364*HIGHSPREAD_{t-1}$$; R-squared = 0.708
(22.04) (8.82)

where,
HIGHSPREAD = net percent of loan officers reporting an increase in the loan spread.

SBIC Financing and Small Businesses

While self-funding and bank funding are the largest sources of capital for small businesses and undoubtedly will continue to be, venture capital became a growing source of finance in the 1990s and a highly publicized one. With the turn of the century and the economic downturn, availability of these funds has fallen. It is difficult to determine if venture capital funding will ever regain the same shine it has had in recent years. Given some findings that have linked venture capital investments to technological innovation (Kortum and Lerner, 1998), it undoubtedly will continue to play a role in the financing of firms. Many venture capital firms tend to fund firms after their initial start-up periods and may focus on taking firms into the IPO markets. However, SBIC funding is more likely to help fund small

companies prior to reaching that stage in their development. The Small Business Administration (SBA) licenses SBICs, which are privately owned and managed venture capital companies. These companies use a combination of their own capital and money borrowed from the SBA to provide financing to small businesses. To be eligible for SBIC financing, small businesses must have tangible net worth of less than $18 million dollars and net income less federal taxes excluding carryover losses of less than $6 million. SBICs provide financing through direct loans, debt with equity, and equity for debt financing. Data on SBIC transactions are available in total for years ending in March beginning in 1960. [40]

The SBIC data are available back to 1960 annually, for the year ending in March, for all SBIC activity including direct loans. These data beginning in 1960, however, can give a rough approximation on how venture capital funding for small businesses has behaved in past cycles. Expansions (NBER trough to peak periods) tend to be periods of growth, often quite significant for SBICs. Exceptions were the 1970-73 period where SBIC venture capital fell in both nominal and real terms and in 1980-1981 when investment rose in nominal terms, but fell in real terms.

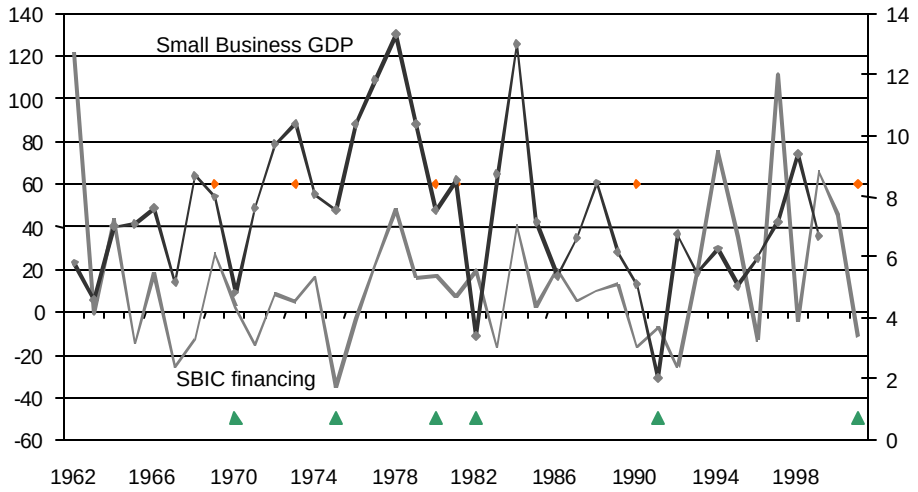
Table A-1: SBIC Loans in Nominal and Real Terms during Economic Expansions

NBER Trough to Peak Economic Expansion	SBIC Annual Equivalent	Nominal Growth	Real Growth
		(annual average percent change)	
Feb. 1961-Dec. 1969	1961-1969	12.8	10.3
Nov. 1970-Nov. 1973	1970-1973	-1.2	-5.7
March 1975- Jan.1980	1975-1980	18.9	7.3
July 1980 - July 1981	1980-1981	6.7	2.5
Nov. 1982 - July 1990	1982 –1990	5.8	2.1
March 1991-March 2001	1991-2001	23.0	20.5
Real loan value is nominal value deflated with the GDP price index			

Chart A-12 shows the percentage change in nominal SBIC loans compared to the peaks and troughs of the business cycle and compared to the percentage change in current dollar small business GDP. The pattern is quite similar to that of bank loans except that the

[40] For more detailed information, data are available on a government fiscal year basis from 1992, and comparisons with other venture capital data are available on a calendar year basis from 1997. Unlike the other venture capital data, the data are included at the time when SBA receives information on investments and not when funds are paid to companies receiving capital. John Wilmeth of the SBA provided quarterly data on debt plus equity and equity financing for first quarter 1997 to second quarter 2002.

Chart A-12 : Percent Change in Nominal Dollar SBIC Capital Financing(left axis) and Small Business GDP(right axis)



point of decline more often follows the trough of the business cycle than is seen in bank loans. The largest increases in SBIC funding tend to come at points well before the peak of the business cycle. During the early part of the period, the largest increases correspond with the largest increases in small business GDP. This is a logical outcome, indicating the point at which the demand for financing continuing expansion and growth is strongest and probably also when the positive outlook for a good return on the capital is the highest on both sides. The period of expansion shows several strong spikes in SBIC funding which are different from the earlier relationships for these two series. While small business GDP growth was positive and relatively strong during the 1990s expansion, the SBIC increases tended to be much larger. This corresponds to a period where evaluations of all venture capital projects were being influenced by high stock market valuations for high technology companies. Those market valuations later proved illusory. It is unlikely the relationship between SBIC funding and small business GDP seen during the most recent expansion will be repeated.

Conclusions- Cyclical Patterns in Small Business Financing

The cyclical pattern of loans is much as expected. The rate of increase in loans to noncorporate business is reduced, and the loans to corporate business often decline, during the periods of recession. This probably reflects a combination of lower demand but also, based on

the charts of the NFIB and Loan Officers' survey, reflects periods in which banks tighten lending standards and make loans more difficult to obtain. The largest increases in loans often occur a year or two before the peak of the business cycle. The SBIC financing follows a similar pattern although it tends to hit its low point a little bit after the trough of the recession.

While recent NFIB results would suggest that financing and interest rates are not the most important concern of small businesses in recent years, those factors clearly do influence business decision making about expansion and growth. Consequently, it is helpful to have some indicators of when small businesses may perceive that credit problems are a growing problem. The Loan Officers' Survey of the Federal Reserve provides some signals as to when small business owners can expect to be facing credit and financing problems.

A more complete understanding of the cyclical nature of loan demand by business size would be improved if the data on loans contained better measures of the business size of the company receiving the loan. The ability to separate corporate loans between the small and large businesses borrowing the money would provide more information about the cyclical nature of loan demand by business size. Since even this simple analysis implies that noncorporate and corporate businesses have slightly different patterns, it would be interesting to see if small corporate business act more like the small noncorporate sector or the large corporate sector. While there are some sources of loan information that can be used to proxy that split, such as using the size of the loan as a proxy for the size of the company, the ability to identify the borrowing company would be an improvement.

Appendix B

Impact of Inflation on the Analysis--Comparisons to Real GDP

GDP by business size calculations are done in current dollars, and the regressions in Tables 1 through 3 used current dollar data on both sides of the equations. However, inflation has been quite different during the different periods of expansion and contraction in the U.S. economy. BEA does not deflate the income side of the accounts, it only deflates the product side. Consequently, it is not possible to produce real estimates of the compensation and noncompensation sub-components of GDP by industry. However, total industry GDP can be deflated (just as the product side of GDP is deflated) to produce estimates of inflation adjusted GDP by industry.

Unfortunately, it is impossible to calculate small and large business price deflators for these industries. Price statistics are not published (or collected) in a manner that allows one to determine if price changes are different between small and large businesses. However, it is obvious that the price deflators vary by industrial sector. Therefore, differences in price changes between industries over time may impact the relationship of the industry to the overall measure of GDP. Consequently, one thing that can be done is to deflate the total industry GDP, and its large and small business GDP measures, with the deflator for that industry and then compare the movement in the real series with that of the real GDP. The regressions presented on Table B-1 are estimated using nonfarm business GDP excluding housing as the explanatory variable. Of the three explanatory variables investigated, it was closest in definition to the explanatory variable used to estimate the relationships shown in Tables 1 through 3. [41] The regression results in the first column reflect the estimates of the change in industry GDP, adjusted for inflation, corresponding to a 1 percent change in real private nonfarm business GDP excluding housing. The results are similar to those in Table 2. Manufacturing and mining, and the construction sector have slope coefficients that exceed one. A one percent change in the real nonfarm business GDP variable results in a larger

[41] The data for the regressions shown in Table B-1 are not available over the same time period as the current dollar estimates presented in Tables 1-3 because BEA does not calculate the industry-specific price deflators for the period prior to 1977. The Table B-1 regressions are estimated for 1977 through 1999.

change in the real output of these two sectors. The slope coefficients for TCPU, FIRE, and services are all less than one, indicating that these industries are less cyclically sensitive than the overall economy. The trade sector coefficient is less than 1, but at 0.94 is within one standard deviation of unity.

The slope coefficients quantifying the real relationships for the cyclically sensitive sectors are a little larger than in the current dollar relationships. A percent change in real GDP is consistent with a 2.1 percent change in real construction output compared to a 1.3 percent change in current dollar terms. Mining and manufacturing increase 1.5 percent in real terms for a percent change in real nonfarm business, similar to the 1.47 percent change in current dollars. Trade shows a 0.94 percent change in real terms compared to 0.86 percent change in nominal terms. This general result could be explained by sticky prices. Then one might expect to see more volatility in real than in current dollar relationships. However, the result does not hold true for all industries. The coefficient for FIRE is almost the same in real and nominal terms, 0.69 compared to 0.71. However, TCPU and services both show substantially smaller coefficients in real terms than in nominal terms. TCPU changes only 0.4 percent for each percent change in the real nonfarm business variable compared to a 0.8 percent change in current dollar terms. The coefficient for the services industry is 0.48 compared to 0.73 in current dollar terms, a relatively large difference.[42]

[42] Explaining the differences between the real and nominal regression results is complex. The results in the services sector are not merely the result of services inflation being higher than inflation for the overall economy. A constant difference in the rate of inflation will tend to impact the constant term of the regression more than the slope coefficient. The decline in the slope coefficient indicates that the change in the rate of inflation in the services sector has tended to be higher than that in the overall economy.

TABLE B-1- Relationship Between Industry GDP and Industry GDP by Firm Size and Private Nonfarm Business in Real Terms

Regressions are estimated from changes in the natural logs of chained dollar output measures Industry (by Business Size) GDP = f (Private Nonfarm Business x Housing GDP)

	TOTAL INDUSTRY				SMALL BUSINESS				LARGE BUSINESS			
	Coefficient				Coefficient				Coefficient			
Component	Constant	Real GDP	Dummy	R-Square	Constant	Real GDP	Dummy	R-Square	Constant	Real GDP	Dummy	R-Square
Total SB & LB Private Nonfarm GDP (1996 = 100) *												
		Real GDP	-0.0070	1.1071		Real GDP	0.0082	0.8751	0.8637			
		0.0041	0.0956			0.0051	0.1209					
		-1.7171	11.5796			1.6045	7.2359					
Mining and Manufacturing Real Total GDP					**Mining and Manufacturing Real SB GDP**				**Mining and Manufacturing Real LB GDP**			
Real GDP a	-0.0222	1.5023		0.7294	Real GDP -0.0226	1.7351		0.6897	Real GDP -0.0222	1.4286		0.6373
SD	0.0084	0.1980			0.0107	0.2513			0.0099	0.2321		
t-stat	-2.6382	7.5889			-2.1146	6.9054			-2.2529	6.1563		
Construction Real Total GDP					**Construction Real SB GDP**				**Construction Real LB GDP**			
Real GDP a	-0.0556	2.1442		0.7906	Real GDP -0.0606	2.3962		0.7718	Real GDP -0.0429	1.0844		0.1822
SD	0.0102	0.2393			0.0120	0.2824			0.0193	0.4551		
t-stat	-5.4735	8.9611			-5.0528	8.4858			-2.2183	2.3830		
Transportation, Communications, Utilities Real Total GDP					**Transportation, Communications, Utilities Real SB GDP**				**Transportation, Communications, Utilities Real LB GDP**			
Real GDP a	0.0207	0.3802	0.0633	0.3066	Real GDP 0.0027	1.0289	0.0599	0.3860	Real GDP 0.0258	0.1932	0.0644	0.2165
w/ dummy 87 SD	0.0082	0.1918	0.0236		w/ dummy 87 0.0126	0.2935	0.0361		w/ dummy 87 0.0086	0.2010	0.0247	
t-stat	2.5276	1.9821	2.6850		0.2145	3.5055	1.6603		2.9968	0.9613	2.6093	
Trade Real Total GDP					**Trade Real SB GDP**				**Trade Real LB GDP**			
Real GDP a	0.0167	0.9364	-0.0791	0.6278	Real GDP 0.0051	1.0882	-0.0788	0.6028	Real GDP 0.0431	0.6033	-0.0824	0.3606
w/ dummy 87 SD	0.0079	0.1846	0.0227		w/ dummy 87 0.0092	0.2158	0.0265		w/ dummy 87 0.0103	0.2408	0.0296	
t-stat	2.1217	5.0725	-3.4862		0.5572	5.0437	-2.9721		4.1870	2.5058	-2.7842	
Finance, Insurance , Real Estate Real Total GDP					**Finance, Insurance , Real Estate Real SB GDP**				**Finance, Insurance , Real Estate Real LB GDP**			
Real GDP a	0.0106	0.6857		0.4764	Real GDP -0.0185	0.9871	0.0593	0.5649	Real GDP 0.0480	0.2498	-0.0687	0.2641
SD	0.0065	0.1529			w/ dummy 92 0.0087	0.2037	0.0250		w/ dummy 92 0.0085	0.1978	0.0243	
t-stat	1.6323	4.4839			-2.1269	4.8448	2.3692		5.6735	1.2632	-2.8277	
Services Real Total GDP					**Services Real SB GDP**				**Services Real LB GDP**			
Real GDP a	0.0208	0.4794		0.5052	Real GDP 0.0131	0.5053		0.4912	Real GDP 0.0428	0.3945		0.1526
SD	0.0043	0.1012			0.0047	0.1096			0.0077	0.1804		
t-stat	4.8372	4.7370			2.8107	4.6121			5.5925	2.1869		

*Total small business and large business private nonfarm GDP were deflated by the weighted average price deflator of the six industries using JPC's distribution of small and large business private nonfarm GDP.

The business size regressions based on the real data were not done in a manner that makes them directly comparable to the results in Table 3. Such an exercise would not have yielded interesting results since the deflators for the industry and for its business-size output measures are the same. Consequently, the deflated small and large business series were compared directly to real private nonfarm business GDP excluding housing. The outcomes were somewhat surprising. In every industry the deflated small business output measure shows a larger impact from a one percent change in the real GDP measure than does the large business output measure for the same industry. In all but one industry, the increase in small business output is equal to or larger than the percent increase in the GDP measure. Services is again the exception--small business service output continues to be less cyclically sensitive than overall GDP. Large business services output is even less cyclically sensitive; that is different from the current dollar estimates where large business services output was more cyclically sensitive than small services output.

These findings raise complex questions. The major one is why there is a seeming contradiction between the current dollar and constant dollar results for the sensitivity of small businesses? The results imply that prices do matter in this analysis. Unfortunately, how prices matter is not entirely clear. The deflators will not match the large and small business portions of each industry equally well. However, for any given industry at this level of aggregation, it is difficult to know for which business size the deflator is more representative, and therefore, which of the deflated relationships is a better measure of the real output relationships.

The deflators that BEA produces for GDP by industry can be very volatile and tend to be more so for the most disaggregated industries. Consequently, the next step in this process was to try to determine if an aggregated price measure would smooth out some of the volatility. To this end, JPC produced weighted small business and large business chain price deflators to use in deflating total large business and total small business GDP. Large and small businesses are distributed quite differently across industries and that fact was used to produce the deflators in Table B-2. Chained Fisher indexes for the overall small and large business GDP were calculated using the underlying industry price deflators provided by BEA and each industry's share of the annual GDP by business size. The growth rates of

TABLE B-2: Implied Price Deflator for Small and Large Business Private Nonfarm GDP

Year	SB Deflator	LB Deflator
1977	42.72	48.88
1978	45.88	52.27
1979	49.76	56.55
1980	54.91	63.51
1981	60.55	72.04
1982	64.61	76.45
1983	67.02	76.72
1984	69.53	78.50
1985	71.95	79.89
1986	73.63	80.35
1987	76.57	81.27
1988	79.20	83.38
1989	82.10	86.38
1990	85.67	89.48
1991	88.72	92.17
1992	91.25	94.33
1993	93.85	96.36
1994	96.21	97.98
1995	98.63	99.14
1996	100.00	100.00
1997	101.78	101.27
1998	103.24	101.94
1999	105.29	102.39

Note: Small and large business implied price deflators are chain-weighted BEA industry price deflators using JPC's distribution of small and large business private nonfarm GDP as weights.

the two deflators are different. The "small business" deflator increased at an annual rate of 4.2 percent between 1977 and 1999, while the "large business" deflator increased only 3.4 percent per year. This difference reflects the heavier weight in the small business deflator of the service-producing sectors and the heavier weight in the large business deflator of the goods-producing sectors.

The chained deflators were then used to produce constant dollar small and large business GDP series through deflation of the aggregated small and large business current dollar estimates of private nonfarm GDP. The fluctuations in the constant dollar series were then compared to fluctuations in private nonfarm business GDP excluding housing. The results showed that the small business aggregate changed by 1.11 percent for each percent change in the real nonfarm business variable. Large business was somewhat less sensitive, changing 0.88 percent for each percent change in the real nonfarm business variable. This is

opposite of the results found in Table 1. Based on the current dollar aggregates, the small business slope coefficient was 0.92 and the large business slope coefficient was 1.09.

Given that services is over a third of small business GDP, the fact that the aggregate relationship shows small business slightly more sensitive to cyclical changes than the overall economy would imply that the volatility in the other sectors more than offset the seeming stability of the service sector. The greater stability of the real large business sector in many industries is more difficult to explain except that it implies that price changes are causing much of the sensitivity in the current dollar relationships. Given the volatility of the deflators used for GPO, these relationships should be viewed with a critical eye. Prices do matter but the use of the wrong deflators can also provide misleading results.

The area of prices by business size is an area that could use further study. Some studies have looked at the cyclical fluctuations in margins, which have implications for the behavior of prices in different sectors of the economy (Domowitz, Hubbard and Petersen, 1988). Additional work in that area might provide some insight into the cyclical nature of price movements. However, the issues related to the possibility of consistent price differences in small and large firms probably would require a more direct study of the survey data collected by the statistical agencies, such as the BLS.

Appendix C- Current Dollar Estimates for 1977-1999

TABLE C-1 Movement in Industry GDP Related to that in Private Nonfarm GDP

Regressions are estimated as change in natural logs of current dollar variables, industry component = f(equivalent total private nonfarm GDP component)

Component		TOTAL INDUSTRY Constant	Coefficient	Dummy	R-Square
Mining and Manufacturing					
GDP	a	-0.0526	1.4631		0.8196
	SD	0.0114	0.1456		
	t-stat	-4.6	10.0		
Compensation	a	-0.0408	1.2610		0.8993
	SD	0.0069	0.0898		
	t-stat	-5.9	14.0		
Noncompensation	a	-0.0692	1.7525		0.6059
	SD	0.0244	0.2970		
	t-stat	-2.8	5.9		
Wholesale and Retail Trade					
GDP	a	0.0066	0.8567		0.7608
	SD	0.0080	0.1017		
	t-stat	0.8	8.4		
Compensation	a	-0.0005	0.9596		0.9396
	SD	0.0040	0.0518		
	t-stat	-0.1	18.5		
Noncompensation	a	0.0093	0.8134		0.4460
	SD	0.0155	0.1880		
	t-stat	0.6	4.3		
Construction					
GDP	a	-0.0364	1.4984	-0.1240	0.4947
w/ dummy 81	SD	0.0247	0.3232	0.0432	
	t-stat	-1.5	4.6	-2.9	
Compensation	a	-0.0220	1.3142	-0.0715	0.6720
w/ dummy 81,91 (+1,+1)	SD	0.0181	0.2313	0.0222	
	t-stat	-1.2	5.7	-3.2	
Noncompensation	a	0.0181	0.7170	0.1565	0.3996
w/ dummy 81,84 (-1,+1)	SD	0.0322	0.3911	.0432	
	t-stat	0.6	1.8	3.6	
Finance, Insurance and Real Estate					
GDP	a	0.0280	0.8318	0.0497	0.6687
w/ dummy 83,94 (+1,-1)	SD	0.0118	0.1498	0.0138	
	t-stat	2.4	5.6	3.6	
Compensation	a	0.0331	0.7970		0.4231
	SD	0.0149	0.1925		
	t-stat	2.2	4.1		
Noncompensation	a	0.0341	0.7190	0.0561	0.5362
w/ dummy 78,94	SD	0.0154	0.1873	0.0207	
(+1,-1)	t-stat	2.2	3.8	2.7	
Transportation, Communication and Public Utilities					
GDP	a	0.0116	0.7717		0.6103
	SD	0.0102	0.1296		
	t-stat	1.1	6.0		
Compensation	a	-0.0034	0.9159		0.7541
	SD	0.0085	0.1107		
	t-stat	-0.4	8.3		
Noncompensation	a	0.0161	0.7616		0.4256
	SD	0.0151	0.1831		
	t-stat	1.1	4.2		
Services					
GDP	a	0.0302	0.8655	0.0388	0.7430
w/ dummy 82	SD	0.0086	0.1073	0.0143	
	t-stat	3.5	8.1	2.7	
Compensation	a	0.0315	0.9204	0.0338	0.7515
w/ dummy 82	SD	0.0087	0.1115	0.0148	
	t-stat	3.6	8.3	2.3	
Noncompensation	a	0.0428	0.5570	0.0495	0.4875
w/ dummy 77	SD	0.0129	0.1629	0.0260	
	t-stat	3.3	3.4	1.9	

Table C-2 Relationship of Small and Large Business to Its Industry 1977-1999

Regressions are estimated in change of natural logs in current dollars Business Size by Industry Component = f (Total Industry Component)

Component		SMALL BUSINESS Constant	Coefficient	Dummy	R-Square	Component		LARGE BUSINESS Constant	Coefficient	Dummy	R-Square
Mining and Manufacturing						**Mining and Manufacturing**					
GDP	a	0.0085	0.9322	0.0785	0.7966	**GDP**	a	-0.0050	1.0408		0.9645
w/ dummy 98	SD	0.0074	0.1027	0.0221			SD	0.0030	0.0425		
	t-stat	1.2	9.1	3.6			t-stat	-1.7	24.5		
Compensation	a	0.0109	0.9635	0.0987	0.9272	**Compensation**	a	-0.0038	1.0144	-0.0411	0.9902
w/ dummy 98	SD	0.0041	0.0659	0.0116		**w/ dummy 98**	SD	0.0014	0.0222	0.0039	
	t-stat	2.7	14.6	8.5			t-stat	-2.7	45.8	-10.5	
Noncompensation	a	0.0145	0.8119	-0.0783	0.6905	**Noncompensation**	a	-0.0030	1.0516		0.9601
w/ dummy 77,81,82	SD	0.0123	0.1272	0.0256			SD	0.0044	0.0457		
(-1,+1,+1)	t-stat	1.2	6.4	-3.1			t-stat	-0.7	23.0		
Construction						**Construction**					
GDP	a	-0.0011	1.0598		0.9590	**GDP**	a	-0.0046	0.7754		0.3036
	SD	0.0041	0.0467				SD	0.0209	0.2382		
	t-stat	-0.3	22.7				t-stat	-0.2	3.3		
Compensation	a	0.0035	1.008		0.9209	**Compensation**	a	-.0220	1.0355		0.4304
	SD	0.0053	0.0629				SD	0.0207	0.2467		
	t-stat	0.7	16.0				t-stat	-1.1	4.2		
Noncompensation	a	-0.0016	1.0339		0.9900	**Noncompensation**	a	0.0400	0.4315	-0.3106	0.1571
w/ dummy 84	SD	0.0023	0.0222			**w/ dummy 92**	SD	0.0422	0.3921	0.1482	
	t-stat	-0.7	46.6				t-stat	0.9	1.1	-2.1	
Transportation, Communications and Public Utilities						**Transportation, Communications and Public Utilities**					
GDP	a	0.0391	0.4795	0.0707	0.6883	**GDP**	a	-0.0101	1.1305		0.9350
w/ dummy 82,84	SD	0.0102	0.1387	0.0125			SD	0.0047	0.0635		
(-1,+1)	t-stat	3.8	3.5	5.7			t-stat	-2.2	17.8		
Compensation	a	0.0146	0.8862	0.0350	0.8731	**Compensation**	a	-.0044	1.0348	-0.0119	0.9905
w/ dummy 96	SD	0.0050	0.0718	0.0100		**w/ dummy 96**	SD	0.0016	0.0225	0.0031	
	t-stat	2.9	12.3	3.5			t-stat	-2.8	46.0	-3.8	
Noncompensation	a	0.0539	0.2456	0.1416	0.6617	**Noncompensation**	a	-0.0170	1.2394	-0.0390	0.9464
w/ dummy 82, 84	SD	0.0148	0.1807	0.0226		**w/ dummy 82,84**	SD	0.0052	0.0630	0.0079	
(-1,+1)	t-stat	3.6	1.4	6.3		**(-1, +1)**	t-stat	-3.3	19.7	-5.0	

Table C-2 1977-1999 Results (continued)

		SMALL BUSINESS				LARGE BUSINESS				
Component		Constant	Coefficient	Dummy	R-Square	Component	Constant	Coefficient	Dummy	R-Square
Wholesale and Retail Trade						**Wholesale and Retail Trade**				
GDP	a	-0.0055	0.9829		0.8542	**GDP** a	0.0094	1.1351	-.0720	0.7912
	SD	0.0064	0.0863			**w/ dummy 98** SD	0.0101	0.1348	0.0176	
	t-stat	-0.8	11.4			t-stat	0.9	8.4	-4.1	
Compensation	a	-0.0062	1.0112	0.0602	0.9801	**Compensation** a	0.0105	1.0021	-0.1067	0.9497
w/ dummy 98	SD	0.0025	0.0339	0.0044		**w/ dummy 98** SD	0.0047	0.0628	0.0082	
	t-stat	-2.5	29.8	13.5		t-stat	2.3	15.9	-13.0	
Noncompensation	a	-0.0106	0.9903		0.8473	**Noncompensation** a	0.0283	1.0564		0.4634
	SD	0.0072	0.0893			SD	0.0190	0.2362		
	t-stat	-1.5	11.1			t-stat	1.5	4.5		
Finance, Insurance and Real Estate						**Finance, Insurance and Real Estate**				
GDP	a	-0.0189	1.0430	0.0474	0.8492	**GDP** a	0.0297	0.8995	-0.0650	0.6900
w/ dummy 91,92	SD	0.0097	0.1015	0.0114		**w/ dummy 92** SD	0.0139	0.1444	0.0235	
(-1,+1)	t-stat	-2.0	10.3	4.1		t-stat	2.1	6.2	-2.8	
Compensation	a	-0.0017	0.9116	-0.0362	0.8661	**Compensation** a	-0.0005	1.0738	0.0214	0.9472
w/ dummy 94	SD	0.0089	0.0911	0.0144		**w/ dummy 94** SD	0.0055	0.0556	0.0088	
	t-stat	-0.2	10.0	-2.5		t-stat	-0.1	19.3	2.4	
Noncompensation	a	-0.0102	0.9334		0.6491	**Noncompensation** a	0.0327	1.0061	-0.1171	0.5882
	SD	0.0141	0.1446			**w/ dummy 92** SD	0.0210	0.2127	0.0429	
	t-stat	-0.7	6.5			t-stat	1.6	4.7	-2.7	
Services						**Services**				
GDP	a	-0.0050	0.9811		0.9553	**GDP** a	0.0027	1.1731		0.8069
	SD	0.0045	0.0452			SD	0.0121	0.1217		
	t-stat	-1.1	21.7			t-stat	0.2	9.6		
Compensation	a	0.0001	0.9390		0.9503	**Compensation** a	-0.0034	1.1583		0.8814
	SD	0.0047	0.0457			SD	0.0093	0.0903		
	t-stat	0.0	20.5			t-stat	-0.4	12.8		
Noncompensation	a	-0.0119	1.0649		0.9262	**Noncompensation** a	0.0383	.9562	0.1533	0.3621
	SD	0.0059	0.0639			**w/ dummy 85,94** SD	0.0398	0.4245	0.0489	
	t-stat	-2.0	16.7			**(+1,+1)** t-stat	1.0	2.3	3.1	

*GDP in this table refers to private nonfarm GDP. It consists of compensation for employees, and noncompensation, which includes profit-type income, net interest, capital consumption allowances and indirect business taxes.

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