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Connecticut's Labor Market Dynamics:

Job Creation, Destruction, and Reallocation

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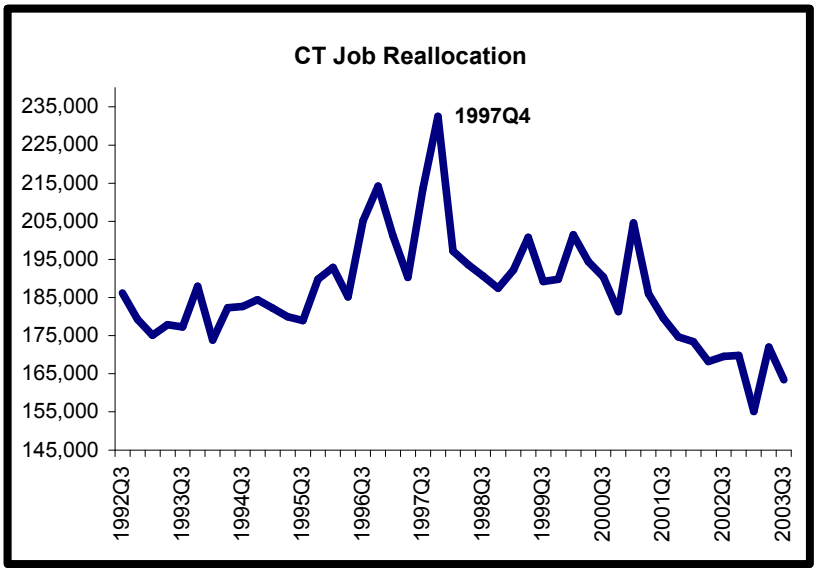
Executive Summary

To measure the dynamism of a given labor market, the number of jobs created and the number of jobs destroyed by business establishments are summed to obtain *job reallocation*. Job reallocation measures the intensity of labor market activity in the economy. Newly available data are now allowing this previously unavailable glimpse below the surface of the State's labor market. Some of the findings are surprising, and some reveal newly discovered features of the economy available only from a dynamic perspective.

The evidence in this paper indicates that Connecticut's level of dynamic activity has continuously declined since 1997. Connecticut's job reallocation activity rose coming out of the trough of the State's recession in 1992, but then peaked in late 1997 and steadily fell thereafter until the State's next economic trough in the third quarter of 2003. The implication is that of an economy that, for some reason, lost its dynamism after 1997. That is, the level of economic intensity declined, at least with respect to the labor market.



From a long-run trend perspective, even though Connecticut typically has added more jobs than it has eliminated, the State's ability to do so has decreased significantly since 1992. In addition, the decline in job reallocation activity continued beyond the end of the recent economic cycle, and continued into the recovery phase of the current cycle.

During the two recoveries experienced by Connecticut since the early nineties, job growth was slow; in fact, at times, the recoveries were considered jobless in nature. However, this study reveals that this was due to two different reasons. During the recovery in the early 1990's, despite the fact that the number of jobs created in the economy was high, the number of jobs destroyed was also high. Therefore, the net change in jobs was very small. In the current recovery, at least through 2004 – the last year for which data was available, the number of jobs destroyed was low and declined, but the number of jobs created also was low and declined. This, too, resulted in a small net change in employment.

This analysis also finds that the economies of Connecticut and the United States are structurally different from one another. Whether analyzing the long run or the business cycle, Connecticut's job flows behave differently from those of the U.S. Further, the findings indicate that the

prevailing view of business cycles fails to explain many of the results that are reported in this paper that were obtained from looking at the dynamics of the labor market by examining job flows over time. For instance, one prevailing view is that job creation and destruction move in opposite directions over the business cycle; that is, during downturns, job creation activity declines while the elimination of jobs increases. This study found that job creation and destruction in Connecticut, during the time period studied, generally moved in the same direction over the business cycle. On the other hand, there was no relationship between the movements of job creation and destruction over the business cycle in the U.S. economy.

The evidence presented in this paper provides researchers, policy makers and other interested readers a glimpse into the dynamic underpinnings of the Connecticut and United States labor markets. The common "snapshot" view of the labor market at a point in time, reflected in the analysis of static net employment changes, is incomplete. When shifting the perspective from a point-in-time, equilibrium approach to observing the flows of job creation and destruction *over time*, it becomes clear that very different dynamic forces can produce the same net change in employment. Therefore, the results we present in this paper are important, not only for economic research, but also for informing economic policy.

The research reported here scratches below the surface of Connecticut's labor market to expose the undercurrents that produce the net outcomes reported by the statistical agencies and recounted in the media. For example, when the Connecticut Labor Department releases its monthly nonfarm employment statistics in the *Labor Situation*, it releases, among other numbers, the change in employment from the previous month and the change from the same month of the previous year. This change is the net result of a process by which existing and newly opening establishments added jobs and establishments closing or contracting eliminated jobs. The sum total of the jobs created by establishments adding jobs minus the sum total of the jobs lost by those eliminating jobs yields the net employment change reported in the *Labor Situation*. This is similar to the process of population growth. Ignoring migration, the natural increase in population is the result of births minus deaths. Likewise, the net employment change is the result of jobs created minus jobs eliminated.

As with any research, just as many questions were raised as were answered. The questions raised here suggest a certain set of directions for future research into the dynamics of the State's labor markets. First, and most obvious, what caused the apparent shift in Connecticut's economy after 1997? Answers to this question lay in changing the focus from aggregate job flows to investigating job flows by industry sector. This would not only take a track into labor market dynamics and business cycles, but also produce some important results in the tangential areas of industrial organization and regional economics. More importantly, answering this question could yield critical insights into the processes that drive Connecticut's economic fortunes and reveal what recent currents portend the State's economic future. In addition, such research could indicate what, if any, policies might foster a climate of sustained growth, particularly in terms of reducing frictions, promoting human capital investment, aligning the supply and demand for skill sets, and reducing other impediments to the efficient and equitable functioning of the State's labor markets.

More specifically, lines of research might focus on the study of establishment dynamics, which may not only offer some clues into the possible structural shift in 1997, but also yield insights into how the opening, closing, expansion, and contraction of establishments drive the aggregate job flows. Future studies of establishment behavior in Connecticut might focus on identifying important establishment characteristics such as age, life expectancy, size, industry, persistency, labor market area, and the role these characteristics play in the creation and destruction of jobs. Finally, with the availability of data on both establishment dynamics and worker histories, the opportunity would be available to explore worker flows, job flows, and their interplay based on more complete information than was previously available.

I. Introduction

In this paper, we report the results of our investigation into the dynamics of Connecticut's labor market. Our research covers two broad categories. The first is the long run trend, in which the focus is on the Connecticut labor market from 1992:Q3 to 2004:Q1. We make comparisons between Connecticut and the United States. This comparison brings to light the possibility that the labor markets in these two economies are structurally different. The second category is the Connecticut labor market over the first complete employment cycle in that same period, which we call the Post Cold War Employment Cycle. Over the two phases of Connecticut's most recent employment cycle, the dynamics of Connecticut's labor market behaved quite differently from those of the United States. Our business cycle research is important because it not only qualitatively supports the seminal work of Davis, Haltiwanger, and Schuh (1996), but also it quantitatively disagrees with their results.

In their landmark work, *Job Creation and Destruction*, Davis et al. (1996) used establishment level manufacturing data on job creation and destruction and obtained results that raised some fundamental questions about the assumptions economists have made about the workings of labor markets. Specifically, their results have serious implications for the prevailing macroeconomic view on business cycles. Davis et al. (1996) particularly focused on the dynamic interplay between creation and destruction that produces the observed outcome of net employment growth. With a focus on static equilibrium and, for the most part, having in view only the net result of this dynamic interplay, much of the focus in economics has missed the creative destruction that has been driving the outcomes reported by the popular press.

Our research extends the scope of investigation to the entire private sector of the Connecticut and U.S. economies. Newly available data from Connecticut's Quarterly Census of Employment and Wages (QCEW) database are now allowing a, heretofore, unavailable glimpse below the surface of the State's labor market. Some of the findings are surprising, and some reveal newly discovered features of the economy available only from a dynamic perspective.

Section III describes the concepts and definitions used in this study. Section IV turns to a discussion of the data used in this research. Section V focuses on the long term trends in the dynamics of the Connecticut labor market from 1992:Q3 to 2004:Q1. Section VI provides a brief history of Connecticut's Post World War II employment cycles and provides the context for the discussions in Sections VII and VIII. In Section VII, we examine Connecticut's labor market dynamics over the Post Cold War Employment Cycle. Section VIII tracks Connecticut's job flows over the previous two recoveries, looks at the behavior of job creation and destruction over the employment cycle and compares it to the results obtained by Davis et al. (1996). Section VIII also explains how these results fit with the prevailing view of business cycles. Finally, Section IX provides some concluding remarks and offers some proposals for future research.

II. Motivation

Microeconomic research conducted by labor economists revealed inconsistencies between the prevailing views established in macroeconomics and the findings of these microeconomic studies

(Hamermesh, 1993). Davis, Haltiwanger, and Schuh (1996) used establishment level data on job creation and destruction, and they raised questions regarding the fundamental assumptions made by economists about the workings of labor markets and the implications for the prevailing macroeconomic view on business cycles. Davis et al. (1996) particularly focused on the dynamic undercurrents of the labor market that produce the observed outcomes (i.e. the net changes in employment). These dynamic undercurrents are job creation and destruction. These processes interact and produce an intense churning of activity that the casual observer cannot see. With a focus on static equilibrium, many labor economics studies miss the dynamic undercurrents. The following example illustrates why researchers and policy makers need to focus on job creation and destruction.

The popular press indicated that a jobless recovery characterized the previous two expansions. This implies that the net employment change was relatively low. However, the net employment change was low because of very different factors. We show that during the former of the two expansions, the total amount of jobs lost in the United States' economy remained very high despite a high number of job gains. However, during the most recent expansion, the total number of jobs gained in the economy remained relatively low despite the fact that the number of jobs lost also remained very low. The two most recent expansions, therefore, had very different forces affecting the labor market even though the net changes in employment were relatively small.

The above example is the underlying motivation for this research. In order for policy makers to enact effective policies, they need to understand the underlying labor market dynamics that produce the observed net change in employment. High numbers of job gains and losses are indicative of a more dynamic set of economic conditions, whereas low numbers of job gains and losses are indicative of a less dynamic set of economic conditions. Yet, both processes may produce similar results (as noted above). Thus, an exclusive focus on the net employment change would miss the very different sets of dynamic processes that produced the two identical outcomes. Therefore, policy makers need to understand the underlying economic processes if they are going to successfully develop policies that foster an economic climate that promotes growth. We hope that the research presented here will provide a greater understanding of the labor market within the state of Connecticut.

Data from Connecticut's Quarterly Census of Employment and Wages (QCEW) program are now allowing a heretofore unavailable glimpse at the job creation and destruction processes that occur in Connecticut. This data also allows us to examine Connecticut's entire private sector. This is different from many prior studies. Historically, research on job creation and destruction focused on the manufacturing sector. Some of the findings are surprising, and some reveal newly discovered features of the economy, which are only available from a dynamic perspective.

Throughout the rest of this paper, we will analyze the dynamics of the labor market in Connecticut over two broad categories. The first is the long run trend. Here, we discuss various facts of the Connecticut labor market from 1992:Q3 to 2004:Q1. During this analysis, we compare Connecticut to the United States. This comparison brings to light the possibility that the labor markets in these two economies are structurally different. The second category that we examine is the behavior of Connecticut's labor market over the first complete employment cycle

in the post-Cold War period. More specifically, we examine this behavior over the most recent recovery/expansion and recession. Just as with the United States, the dynamics of Connecticut's labor market were very different over these two phases of Connecticut's most recent employment cycle.

III. Concepts and Definitions

Before presenting the technical definitions of job creation and destruction, we must introduce this paper's unit of analysis. Job creation and destruction focuses on the demand side of the labor market. Therefore, our unit of analysis is the individual establishment. The definition of an establishment is:

> *Establishment*: an economic unit that produces goods or services, and it is usually a physical location that engages in one, or predominantly one, type of activity (Clayton et al. 2004).

From this definition, it follows that a firm is either a single establishment or a collection of establishments. Establishments fall into one of four broad categories: expanding, opening, contracting, and closing. The definitions are as follows:

> *Expanding establishment*: An establishment that has available employment data in the current period and previous period, and the level of employment increased from the previous to the current period.
>
> *Contracting establishment*: An establishment that has available employment data in the current and previous period, and the level of employment has declined.
>
> *Opening establishment*: An establishment that has positive employment recorded in the current period and had either zero employment or was not in the database in the previous period.[1]
>
> *Closing establishment*: An establishment that had positive employment recorded in the previous period and had zero employment or was not in the database in the current period.[2]

We now present the definitions of job creation, destruction, and reallocation.

[1] An opening establishment is not the same as an establishment birth. A birth is the formation of a new establishment, whereas an opening establishment is one that could be a birth or one that previously closed due to seasonal conditions and then opened. See footnote 13 for a broader discussion.

[2] A closing establishment is not the same as a dying establishment. A death is a permanent closing of an establishment, whereas a closing could be a death or an establishment that closes due to seasonal conditions. See footnote 13 for a broader discussion.

Job creation is equal to the total of all positive employment changes experienced by establishments with positive net employment changes.

Job destruction is equal to the absolute value of all negative employment changes experienced by establishments with negative net employment changes.

Job reallocation is equal to job creation plus job destruction. Researchers use job reallocation as a measure of dynamic economic activity and the intensity of job churning.

Researchers refer to these figures as job flows. Davis et al. (1996) interpret these changes in establishment level employment as changes in desired employment levels. The authors interpret this change as desired because they note how an establishment can fill a vacancy within a three to twelve month period if it desires to do so. These statistics give tremendous insight into the heterogeneity of labor demand across different establishments (Davis et al. 1996). For a given net employment change, high levels of job creation and destruction compel large numbers of workers to shuffle between jobs, and a higher unemployment rate typically results. Higher creation levels imply that it is easier to find employment, and higher levels of destruction imply less job security.

Just as the demand for labor will vary due to business conditions, so to will labor supply. Labor supply has the interesting feature that it will vary due to non-business related conditions. When an individual decides to enter or leave the labor force, then this individual makes a conscious decision to trade non-market activity for labor activity (in the case of entering the labor force), and he is making the same conscious decision to trade labor activity for non-market activity (in the case of exiting the labor force).[3] The previous sentence implies that individuals place some amount of value on not working for an establishment, and instead, partake in non-market activities. Workers can decide to participate in the labor force just as establishments can decide to fill or leave vacant a position. These decisions are idiosyncratic, and therefore, represent worker heterogeneity just as job reallocation reflects establishment heterogeneity. When workers are hired, we call this *worker inflow (WI)* (Ilmakunnas and Maliranta, 2003). When there is worker separation, we call this *worker outflow (WO).* The combination of worker inflow and outflow equals *worker flow (WF)* or *worker reallocation*.

Worker and job reallocation measure two different concepts; however, they are highly intertwined in economic theory. Davis et al. (1996, pg 12) note "Job reallocation equals the maximum amount of worker reallocation directly induced by the reshuffling of employment opportunities across locations." In other words, job reallocation is the amount of worker reallocation that is necessary for establishments to maintain their desired business strategies of either expansion, contraction, opening, or closing. Mortensen and Pissarides (1994) were instrumental in developing a theory of job creation and destruction and relating it to an equilibrium level of unemployment. Through their work, they actually equated worker and job reallocation. However, worker reallocation is typically larger than job reallocation, and this fact appears to be quite consistent over time. In fact, the difference between worker and job

[3] Economists define non-market activity as any activity for which an individual does not receive a taxable wage.

reallocation is called *churning flow (CF)*, and it measures the match heterogeneity over and above that required by establishment heterogeneity (Burgess, Lane, and Stevens 2000). Burgess et al. (2000) attempt to show that this persistence in churning flow is actually an equilibrium concept that arises due to very different personnel policies. In some instances, establishments' optimal policy might be to hire whomever they can find in order to fill a position, and then wait to see if the worker/establishment match is beneficial. In other instances, it might be optimal for the establishment to hire very few workers, and therefore, expend more effort in an attempt to find the best matches initially. The main determinant of the optimal personnel policy is the cost of turnover. Those establishments with low turnover costs will most likely favor the former, and those establishments with higher turnover costs will most likely favor the latter. This description emphasizes the concept that churning flow measures the excess heterogeneity in the difference between worker and job reallocation.

IV. Data

The data used in this study have come from two principal sources, the Office of Research in the Connecticut Labor Department (DOL) and the U.S. Bureau of Labor Statistics (BLS). The data on Connecticut's job creation and destruction and on the expansion, contraction, opening, and closing of establishments comes from records in the QCEW, the prime source of which is drawn from the State's unemployment insurance (UI) program. All businesses covered under unemployment insurance are required to report employment and wage information every quarter for UI tax purposes.[4] The U.S. data on job creation and destruction and the opening and closing, and expansion and contraction of establishments is from the U.S. BLS Business Employment Dynamics (BED) data, which is compiled from the state QCEW records. Following the BLS, we seasonally adjusted all data using the X-12 ARIMA Adjustment procedure.[5] The data is at the quarterly level of frequency, and it ranges from 1992:Q3 to 2004:Q1. The QCEW and the BED contain employment data for all private establishments and the data used are for the third month of each calendar quarter. It excludes establishments that recorded zero employment for two consecutive quarters, government establishments, and private households from the employment measures.

Recall that our focus is on jobs and not workers. Therefore, we are not attempting to follow workers from one establishment to another. Instead, we attempt to analyze the establishment's decision to create a job or destroy a job. Unfortunately, our data do not allow us to distinguish between different types of jobs. For example, we are unable to delineate between an office administrator and an engineer. Therefore, we are unable to directly discuss the distribution of the types of jobs that establishments create or destroy.

Finally, some of the later discussion focuses on the job creation, destruction, and reallocation *rates*, as opposed to levels. This allows us to conduct cross comparisons between various statistics. The denominator used to calculate rates in this study is unconventional, and we discuss it in detail later. We briefly introduce it here. The literature on job creation and destruction constructs the unconventional denominator by using the average of the current and

[4] There are some slight caveats to this. However, the UI tax data is a virtual census.
[5] Non-seasonally adjusted data is also available.

previous quarters' employment. The conventional method of calculating the rate of change uses the previous quarter's employment as the denominator. Though unusual, this method of calculating rates has the advantage of restricting all gross rates to finite positive values between zero and two and all net rate changes between negative two and positive two.[6] As noted by Okolie (2004), this methodology of rate calculation does not significantly effect how net employment growth is calculated. Davis et al. (1996), Burgess et al. (2000), and Ilmakunnas and Maliranta (2003) also utilize this methodology. Therefore, we feel as though it is important to maintain consistency with previous works.

[6] See Ilmakunnas and Maliranta (2003) and Davis et al. (1996) for more information.

V. Trends in Connecticut's Labor Market Dynamics, 1992-2004

A. Connecticut's Labor Market – Job Flows

Figure V-1 plots the level of Connecticut's job reallocation between 1992:Q3 and 2004:Q1. Over the entire period, job reallocation has declined. In 1992:Q3, job reallocation measured 186,164. This number fell to 162,922 in 2004:Q1. This is a decrease of 12.5 percent over a twelve-year period. This implies that the number of reallocated jobs declined each year by approximately 1.04 percent. Even though the overall trend is negative, between 1992:Q3 and 1997:Q4, there was an upward trend in job reallocation. After 1997:Q4, there was an immediately noticeable downward trend.

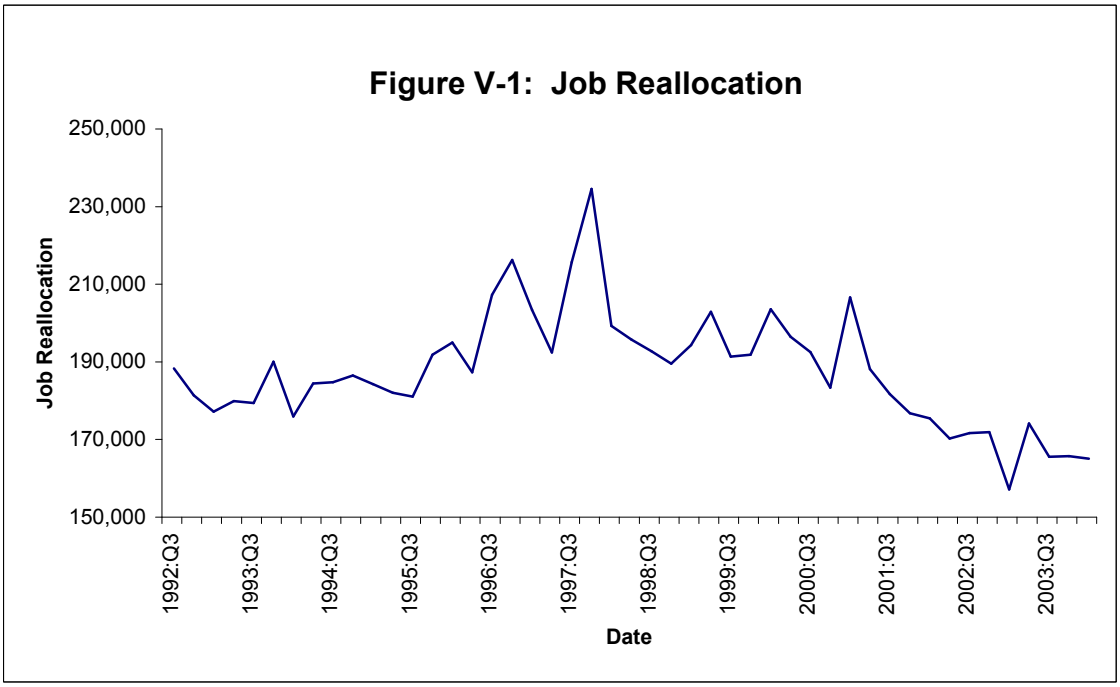


Figure V-1 also exhibits three noticeable peaks in reallocation activity. The first two are during the fourth quarters of 1996 and 1997. The third peak in job reallocation was in the first quarter of 2001. By disaggregating the measure of job reallocation into its respective components (i.e. job creation and job destruction), we will be able to investigate the declining nature of job reallocation and the determinants of the three peaks mentioned previously.

Figure V-2 plots the series of job creation and job destruction for Connecticut over the same period as Figure V-1. Figure V-2 shows that job creation and destruction exhibit the same long-term trend as job reallocation. That is, both series trend downwards. However, before 1997:Q4, both series increased; after 1997:Q4, both series declined.

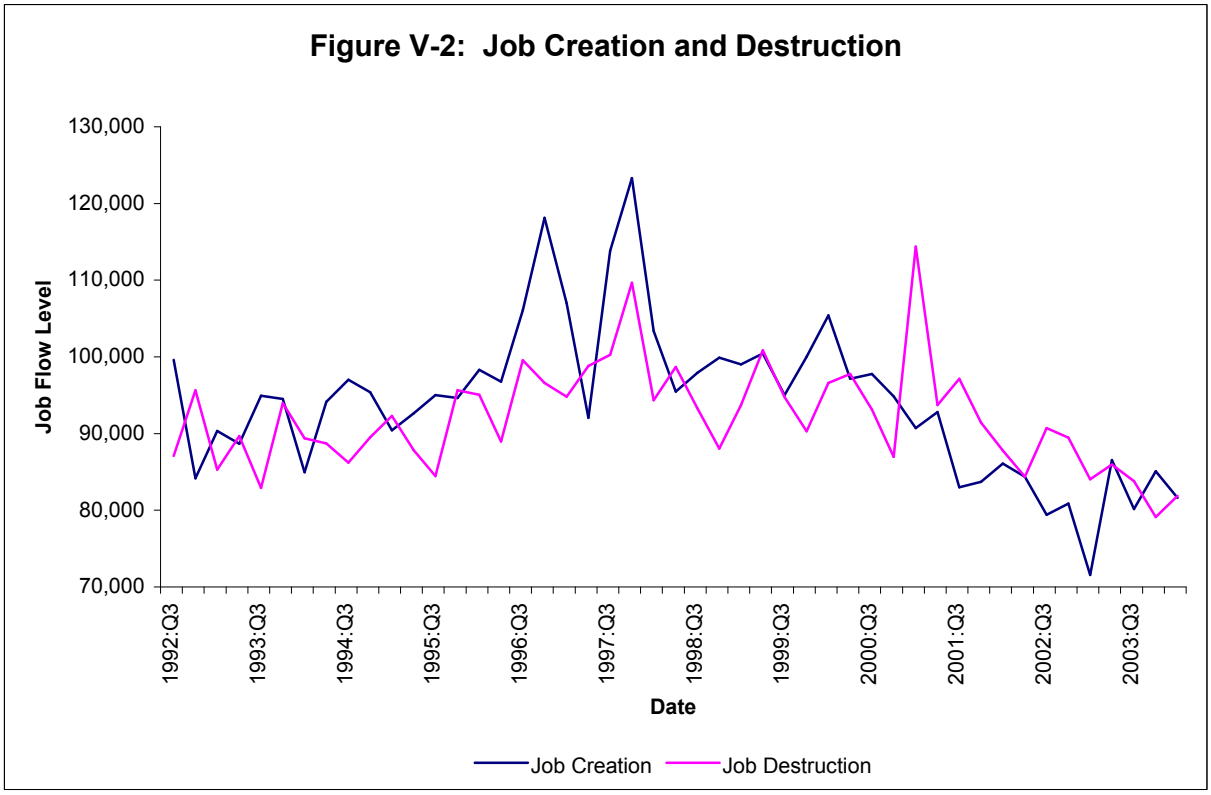


Figure V-2 also shows two very noticeable peaks in job creation during the fourth quarters of 1996 and 1997, whereas there were none in job destruction. In fact, from 1996:Q2 to 1996:Q4, job creation increased by 22 percent whereas job destruction only increased 8 percent. Similarly, from the second to the fourth quarter of 1997, job creation increased 34 percent, and job destruction increased only 11 percent. Therefore, it is rather apparent that the spikes in job reallocation during the fourth quarters of 1996 and 1997 are associated more with increases in job creation rather than increases in job destruction. Figure V-2 also exhibits the fact that there is a peak in job destruction in the first quarter of 2001 at the same time that job creation is experiencing a decline. It is apparent that the peak in job reallocation during 2001:Q1 is associated with job destruction as opposed to job creation.

Job reallocation appears to be associated more with job creation as opposed to job destruction. In fact, the correlation coefficient for reallocation and creation is 0.92, and the coefficient for reallocation and destruction is 0.81. These two coefficients are significantly different at the 5 percent significance level. In fact, Figures V-3 and V-4, below, plot job reallocation versus job creation and destruction, respectively. The movements in job reallocation match those in job creation much better than they match those of job destruction.

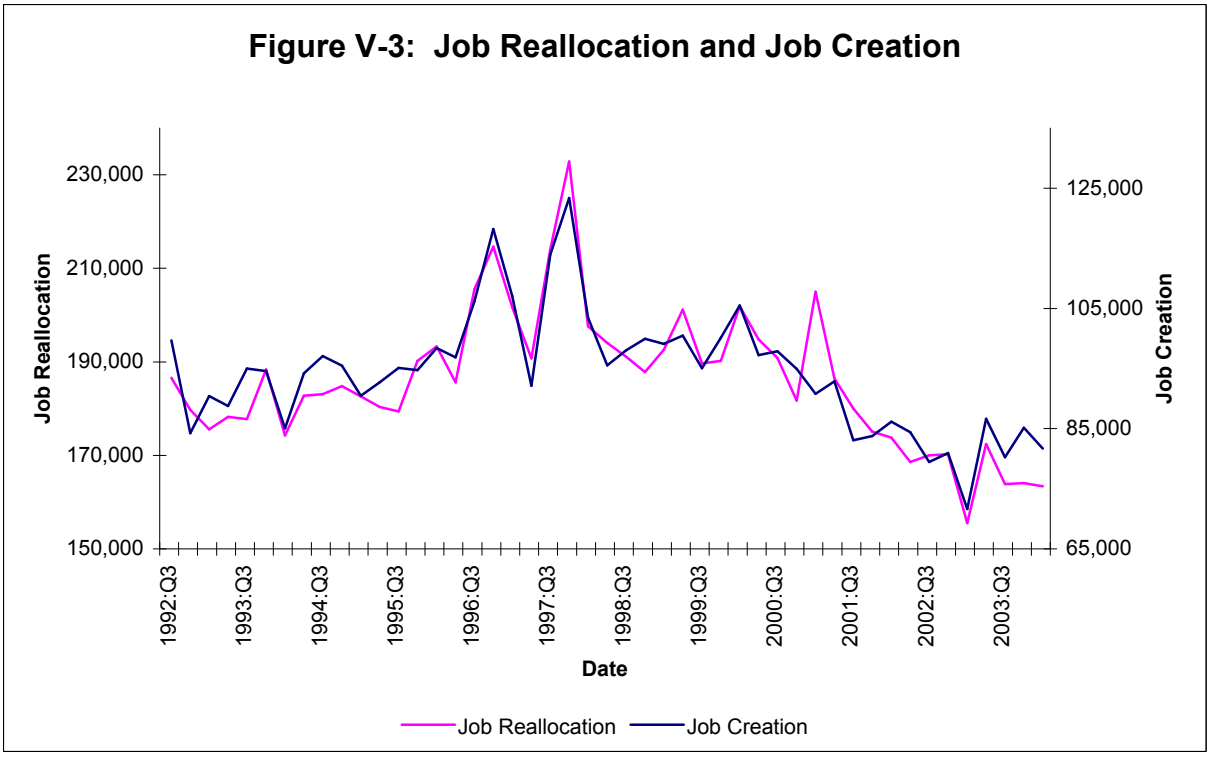


Figure V-3: Job Reallocation and Job Creation
Job Reallocation
230,000
210,000
190,000
170,000
150,000
Job Creation
125,000
105,000
85,000
65,000
1992:Q3
1993:Q3
1994:Q3
1995:Q3
1996:Q3
1997:Q3
1998:Q3
1999:Q3
2000:Q3
2001:Q3
2002:Q3
2003:Q3
Date
Job Reallocation
Job Creation

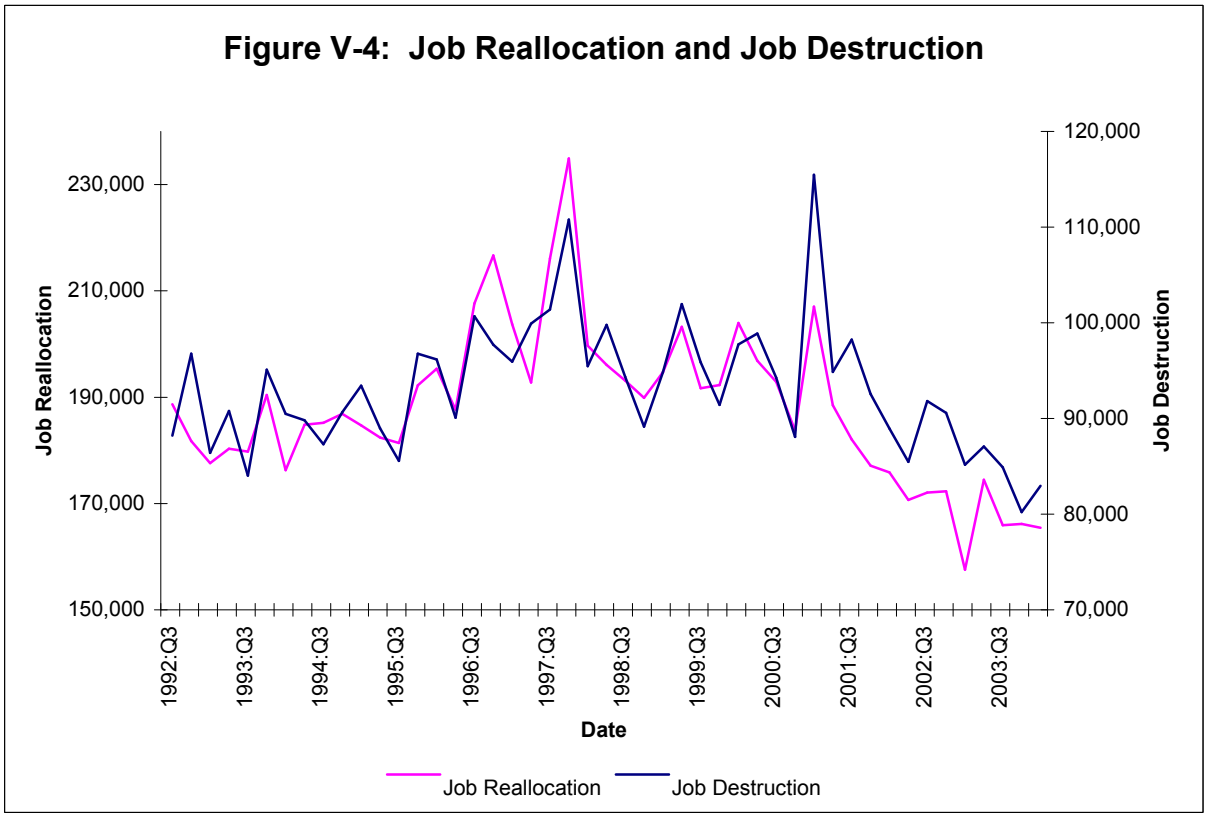
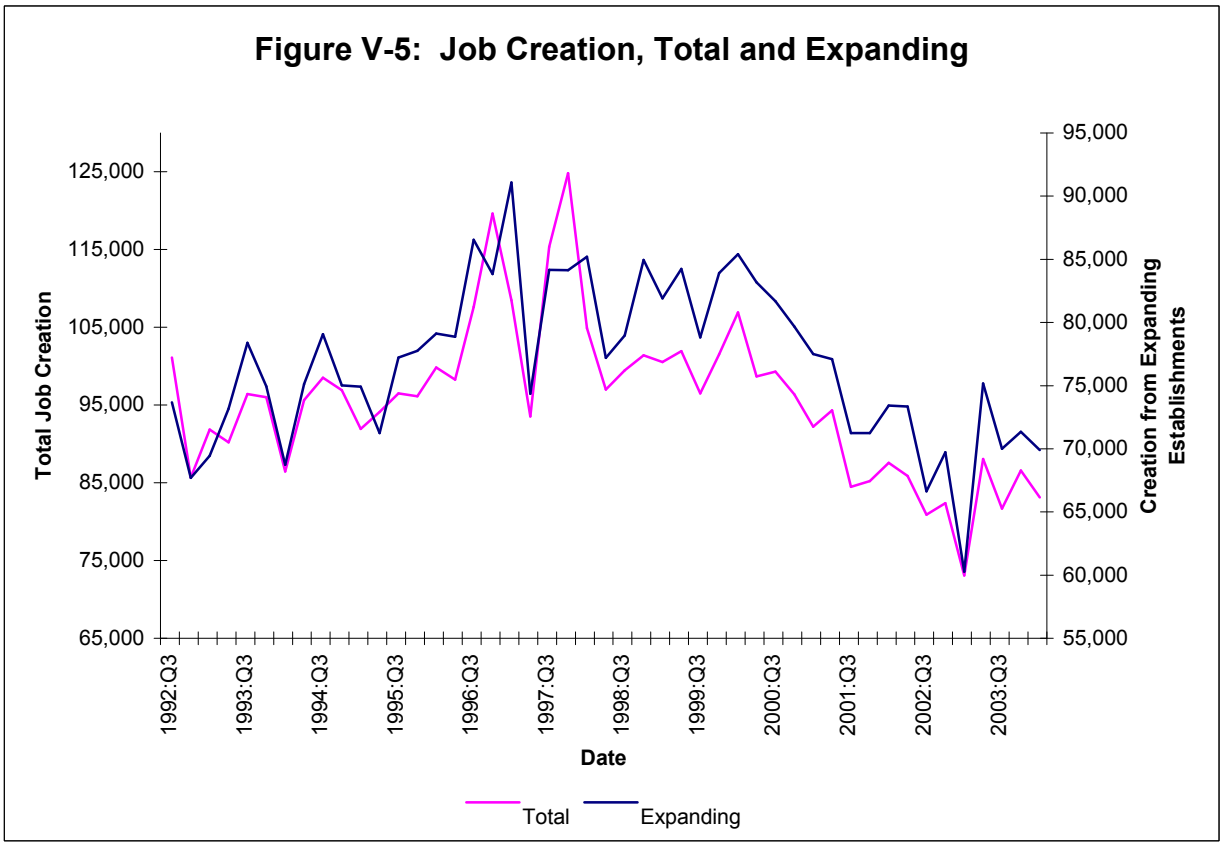


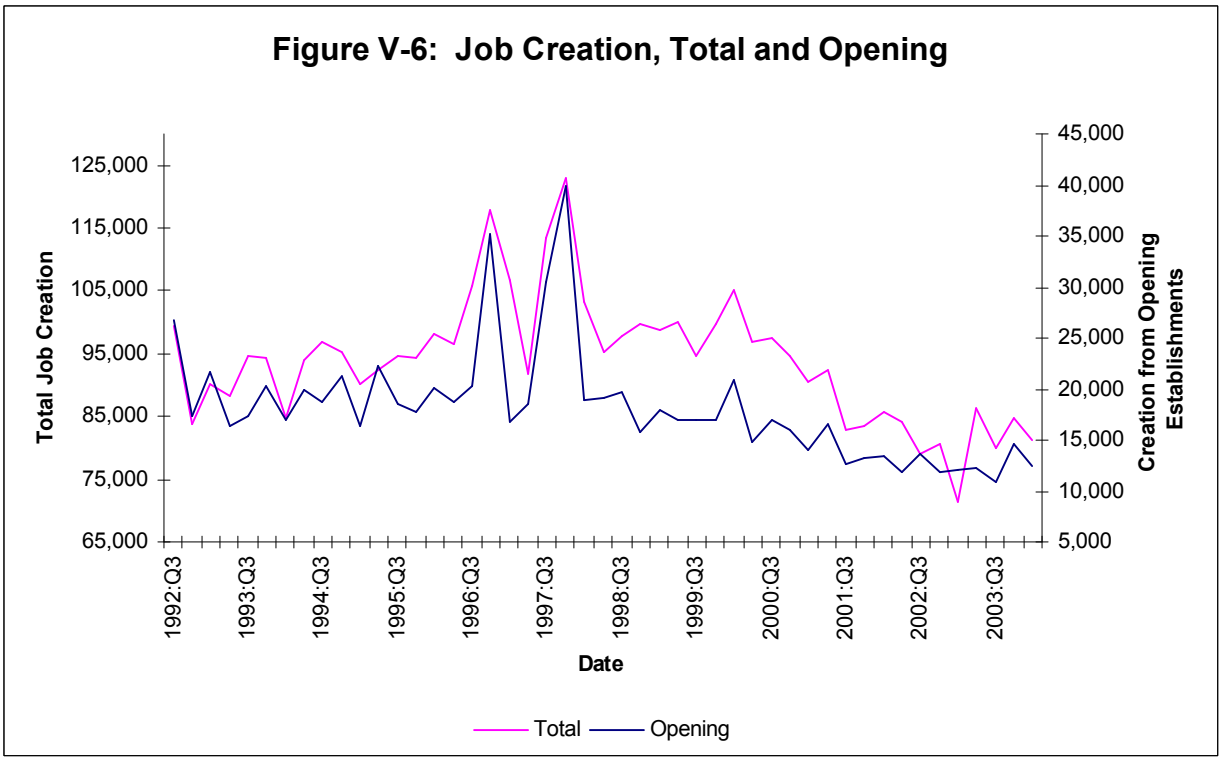
Figure V-4: Job Reallocation and Job Destruction
Job Reallocation
230,000
210,000
190,000
170,000
150,000
Job Destruction
120,000
110,000
100,000
90,000
80,000
70,000
1992:Q3
1993:Q3
1994:Q3
1995:Q3
1996:Q3
1997:Q3
1998:Q3
1999:Q3
2000:Q3
2001:Q3
2002:Q3
2003:Q3
Date
Job Reallocation
Job Destruction

B. Connecticut's Labor Market Dynamics – Establishments and Job Flows

Just as job reallocation is the sum of job creation and destruction, job creation is the sum of creation caused by expanding and opening establishments, and job destruction is the sum of destruction caused by contracting and closing establishments. In fact, it might be instructive to separate creation and destruction caused by the various establishment classifications in order to ascertain more information about the unusual peaks in job reallocation (i.e. those peaks during quarter four of 1996 and 1997, and the peak in the first quarter of 2001). Below are Figures V-5 and V-6, and they plot total job creation by the type of establishment causing it.

Figure V-5 shows the total job creation and that job creation caused by expanding establishments. Figure V-6 shows total job creation and that caused by opening establishments. As both figures show, the trend of the job creation caused by expanding and opening establishments follows the trend of total job creation very well. In fact, the correlation coefficient between the total job creation and that caused by expansions and openings is 0.86 and 0.82, respectively. There is no statistically significant difference between these two coefficients. However, job creation caused by opening establishments exhibits two very noticeable peaks, and both occur during the fourth quarters of 1996 and 1997. Job creation caused by expanding establishments was also high during these two quarters. However, the relative magnitude of job creation caused by expanding establishments was at a virtual plateau and was not experiencing any sharp increases or decreases. Therefore, the job creation by opening establishments seems to be the leading cause behind the peaks in job reallocation that occurred during 1996:Q4 and 1997:Q4.





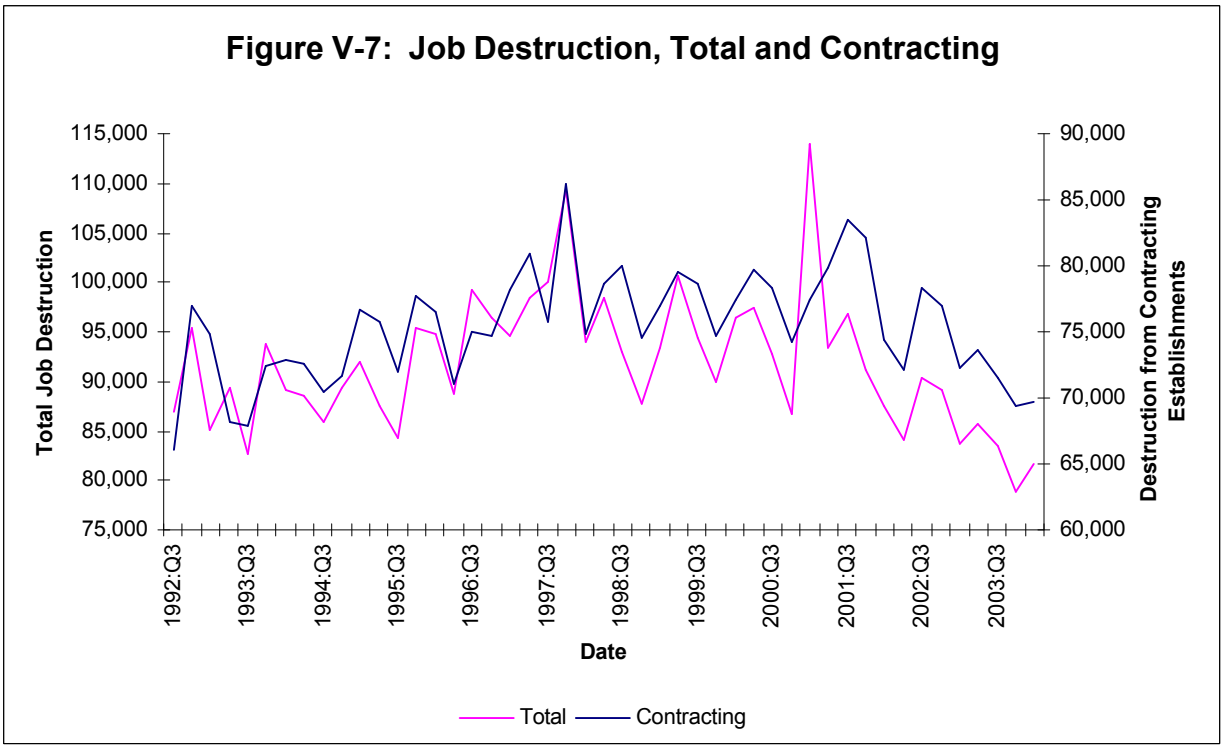
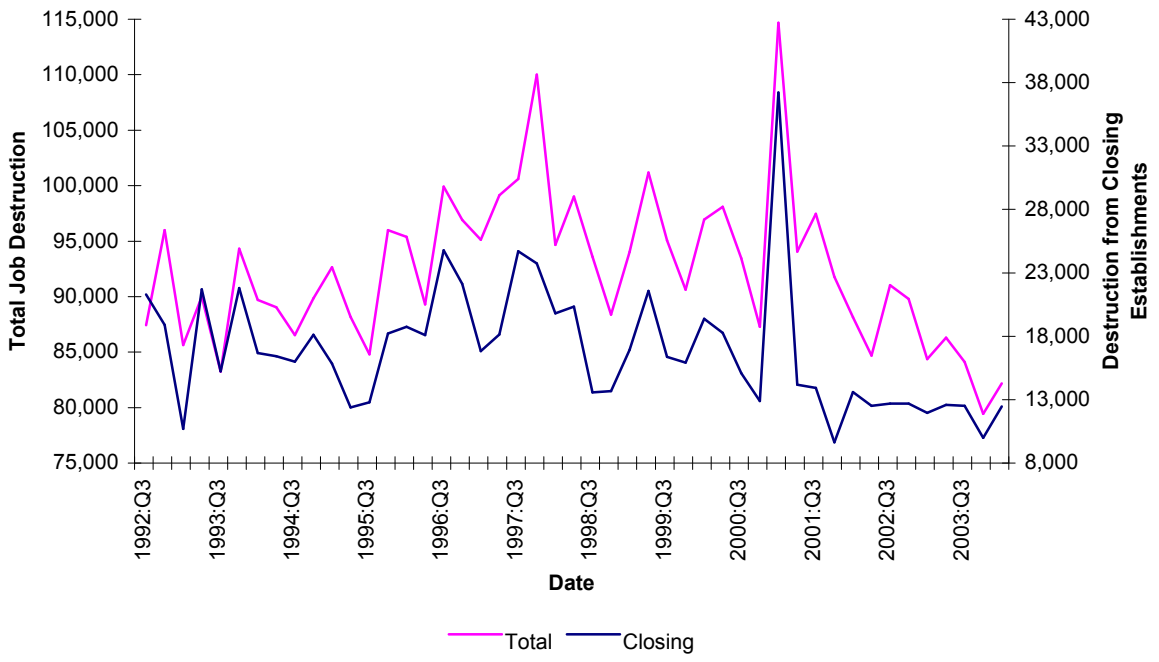


Figure V-7, above, plots the total job destruction and that destruction caused by contracting establishments. Figure V-8, below, displays total job destruction and that destruction caused by closing establishments. Just as with job creation, the movements of destruction caused by

contracting and closing establishments appear to follow the movement of total job destruction closely. The correlation coefficients for total destruction and that destruction caused by contracting and closing establishments are 0.69 and 0.79, respectively. There is no significant difference between these two coefficients. The only noticeable deviation of destruction caused by contracting establishments from total destruction appears in 2001:Q1. Destruction from contracting establishments does not peak at this date. However, there is a peak at this date for destruction caused by closing establishments. Therefore, it appears that the increase in job destruction caused by closing establishments drives the increase in job reallocation.

Figure V-8: Job Destruction, Total and Closing



Three measures that are useful in painting a picture of labor demand from 1992 through 2004 are the job creation/destruction ratio (JCDR), the expanding/contracting ratio (ER), and the opening/closing ratio (OR). We calculate each of these ratios by dividing the jobs created from the establishment category by the jobs destroyed from the establishment category. For example, the JCDR equals total job creation divided by total job destruction. Table V-1 shows these three ratios from 1992:Q3 to 2004:Q1.

Table V-1 exhibits some positive characteristics. Each of these ratios indicates that Connecticut has experienced more job creation than job destruction in every category. In fact, the JCDR is larger than one 28 out of the 47 quarters, i.e. 60 percent of the time. In other words, Connecticut has created more jobs than it has destroyed 60 percent of the time since 1992:Q3. The ER is larger than one 55 percent of the time over this twelve-year period; and the OR is above one 72 percent of the time.

Table V-1: Connecticut's JCDR, ER, and OR							
Date	JCDR	ER	OR	Date	JCDR	ER	OR
1992:Q3	1.144	1.099	1.289	1998:Q3	1.05	0.974	1.516
1992:Q4	0.879	0.865	0.941	1998:Q4	1.135	1.124	1.198
1993:Q1	1.059	0.913	2.133	1999:Q1	1.057	1.049	1.094
1993:Q2	0.989	1.057	0.771	1999:Q2	0.996	1.045	0.808
1993:Q3	1.145	1.138	1.181	1999:Q3	1.003	0.989	1.073
1993:Q4	1.006	1.02	0.958	1999:Q4	1.108	1.11	1.101
1994:Q1	0.951	0.927	1.056	2000:Q1	1.091	1.088	1.105
1994:Q2	1.061	1.02	1.249	2000:Q2	0.994	1.029	0.835
1994:Q3	1.126	1.106	1.213	2000:Q3	1.05	1.029	1.164
1994:Q4	1.066	1.032	1.205	2000:Q4	1.091	1.057	1.293
1995:Q1	0.979	0.962	1.065	2001:Q1	0.793	0.987	0.383
1995:Q2	1.055	0.927	1.872	2001:Q2	0.99	0.952	1.21
1995:Q3	1.125	1.058	1.518	2001:Q3	0.854	0.841	0.937
1995:Q4	0.989	0.987	1.002	2001:Q4	0.915	0.855	1.458
1996:Q1	1.034	1.019	1.1	2002:Q1	0.98	0.971	1.03
1996:Q2	1.088	1.094	1.066	2002:Q2	1.000	1.002	0.989
1996:Q3	1.066	1.138	0.841	2002:Q3	0.875	0.837	1.117
1996:Q4	1.223	1.107	1.626	2002:Q4	0.904	0.891	0.983
1997:Q1	1.129	1.15	1.027	2003:Q1	0.851	0.818	1.059
1997:Q2	0.931	0.906	1.05	2003:Q2	1.007	1.006	1.011
1997:Q3	1.136	1.096	1.262	2003:Q3	0.956	0.963	0.916
1997:Q4	1.125	0.964	1.722	2003:Q4	1.076	1.013	1.537
1998:Q1	1.096	1.125	0.985	2004:Q1	0.997	0.988	1.05
1998:Q2	0.967	0.968	0.965	-	-	-	-

Table V-1 shows the JCDR appears to follow the ER more than the OR. In fact, the correlation coefficient for the JCDR and the ER is 0.8, whereas the coefficient for the JCDR and the OR is 0.5. These coefficients are statistically different from one another at the five percent significance level.

Below, Table V-2 shows the variance of each of these ratios in the second column. The third column compares the variance of each ratio to the variance of the JCDR. We can see that the variance of the JCDR and the ER are almost equal. However, the variance of the OR is between 10 and 11 times larger than the JCDR. This indicates that job creation and destruction from opening and closing establishments, respectively, is highly erratic when compared to total job creation and destruction.

Table V-2: Variances of Connecticut's JCDR, ER, and OR		
Ratio	Variance	Variance to Variance of JCDR
JCDR	0.0084	1.00
ER	0.0076	0.90
OR	0.0894	10.59

Despite the fact that the Connecticut economy has created more jobs than it has destroyed 60 percent of the time from 1992:Q3 to 2004:Q1, it has not been able to do so at the same level as it has since the beginning of the period. The same can be said for the ER and OR. Table V-3 shows this fact more concretely. In this table, we created an index using 1992:Q3 as the base year.

Table V-3: Indexes of Connecticut's JCDR, ER, and OR

Date	JCDR	ER	OR	Date	JCDR	ER	OR
1992:Q3	100	100	100	1998:Q3	91.805	88.688	117.597
1992:Q4	76.866	78.716	73.002	1998:Q4	99.195	102.295	92.939
1993:Q1	92.565	83.108	165.453	1999:Q1	92.37	95.482	84.863
1993:Q2	86.448	96.187	59.841	1999:Q2	87.032	95.161	62.697
1993:Q3	100.105	103.558	91.596	1999:Q3	87.638	89.982	83.242
1993:Q4	87.903	92.816	74.34	1999:Q4	96.851	101.007	85.382
1994:Q1	83.087	84.413	81.906	2000:Q1	95.379	99.025	85.736
1994:Q2	92.766	92.875	96.881	2000:Q2	86.87	93.692	64.77
1994:Q3	98.387	100.716	94.115	2000:Q3	91.78	93.667	90.268
1994:Q4	93.169	93.929	93.456	2000:Q4	95.367	96.263	100.309
1995:Q1	85.603	87.594	82.638	2001:Q1	69.287	89.86	29.685
1995:Q2	92.168	84.34	145.201	2001:Q2	86.525	86.685	93.883
1995:Q3	98.346	96.33	117.776	2001:Q3	74.641	76.525	72.679
1995:Q4	86.473	89.808	77.687	2001:Q4	79.99	77.817	113.087
1996:Q1	90.396	92.73	85.299	2002:Q1	85.669	88.428	79.893
1996:Q2	95.105	99.555	82.664	2002:Q2	87.398	91.194	76.694
1996:Q3	93.143	103.626	65.197	2002:Q3	76.469	76.218	86.637
1996:Q4	106.937	100.788	126.129	2002:Q4	78.982	81.12	76.236
1997:Q1	98.671	104.706	79.632	2003:Q1	74.385	74.481	82.146
1997:Q2	81.406	82.434	81.443	2003:Q2	88.003	91.599	78.39
1997:Q3	99.278	99.747	97.857	2003:Q3	83.6	87.689	71.036
1997:Q4	98.308	87.734	133.577	2003:Q4	94.015	92.179	119.252
1998:Q1	95.803	102.382	76.422	2004:Q1	87.15	89.939	81.458
1998:Q2	84.558	88.121	74.857	-	-	-	-
Base Period = 1992:Q3							

Table V-3 shows a somewhat disconcerting fact. Each of the ratios has shown a slight downward trend from the beginning of the period to the end. The JCDR has seen a decrease of approximately 13 percent, the ER has decreased 10 percent, and the OR has seen a decrease of 19 percent. In fact, each ratio has only reached its 1992:Q3 level a handful of times. The index for the JCDR has only reached 100 or better twice, the ER has only done so eight times, and the OR has only done so nine times. Since these three indices are created from the ratio of job creation to job destruction for various categories of labor, then the indices could be increasing or decreasing due to a variety of movement combinations from the job creation and job destruction ratios. If one looks at the formula for the index of the JCDR, he can see a mathematical link between the ratio and the number of jobs created in a particular period relative to 1992:Q3 and the number of jobs destroyed in a particular period relative to 1992:Q3.

The formulas are below:

Index for the JCDR = $(JC_x/JD_x)/(JC_{92:Q3}/JD_{92:Q3})*100$ (1)

Where:
JC_x = number of jobs created in period x
JD_x = number of jobs created in period x.

Equation (1) is equal to the following formula:

$(JC_x/ JC_{92:Q3})/(JD_x/ JD_{92:Q3})*100$ (2)

From equations (1) and (2), one can observe that when the index is larger than 100, then the number of jobs created per job destroyed in period x is larger than the number of jobs created per job destroyed in 1992:Q3. It also means that the number of jobs created in period x compared to those jobs created in 1992:Q3 is larger than the number of jobs destroyed in period x compared to those jobs destroyed in 1992:Q3. A brief numerical example will make this point clear. Assume $JC_{97:Q4}$ equals 40 and $JD_{97:Q3}$ equals 20. Let $JC_{92:Q3}$ equal 15 and $JD_{92:Q3}$ equal 45. This means that the index for the JCDR in 1997 equals (40/20)/(15/45) = 6. However, from equation (2), we can see that the number of jobs created in 1997:Q3 per job created in 1992:Q3 is 2.67, and the number of jobs destroyed in 1997:Q3 per job destroyed in 1992:Q3 is 0.44. These numbers in the previous sentence indicate that the number of jobs created in 1997:Q3 increased 167 percent since 1992:Q3 and the number of jobs destroyed in 1997:Q3 decreased 56 percent since 1992:Q3. We can take this simple example and make inferences about the trends of the JCDR, ER, and OR. Since the JCDR was above its 1992:Q3 level only twice, then the number of jobs created in subsequent quarters compared to job creation in 1992:Q3 was lower than the number of jobs destroyed in subsequent periods compared to job destruction in 1992:Q3 forty-four times. This was the case for the ER thirty-eight times and for the OR thirty-seven times. Therefore, relative job destruction has been larger than relative job creation in Connecticut for the majority of the twelve-year period.

Before moving on to the comparison between the Connecticut and United States labor markets, one final point must be made about the various spikes in job reallocation during the fourth quarters of 1996 and 1997 and the first quarter of 2001. The JCDR reached its highest value during 1996:Q4. From Table V-1, we can see that the OR reached a value of 1.626 (which is 26 percent above its 1992:Q3 level), and the ER reached a value of 1.107 (which is 0.79 percent above its 1992:Q3 level). This large percentage increase in the OR was lead by a 31 percent increase from 1992:Q3 in job creation from opening establishments over a 4 percent increase in job destruction from closing establishments. Since the ER remained very close to its 1992:Q3 level, the job creation from opening establishments certainly contributes to the increase in job reallocation. A similar analysis leads to the same conclusion for 1997:Q4. As stated above, the JCDR reached its lowest value in 2001:Q1. The decline in this ratio accompanied a decline in the ER to 0.987. However, the decline in the JCDR seemed to be lead by the OR. The OR reached a level of 0.383, which is approximately a 71 percent decline from its 1992:Q3 level (the ER only declined approximately 10 percent since 1992:Q3). This 71 percent decrease in the OR was lead by an increase in the number of jobs destroyed by closing establishments. Compared to

1992:Q3, the number of jobs destroyed by closing establishments increased 76.8 percent. Therefore, the peak of job reallocation in 2001:Q1 seems to be lead by the increase in job destruction from closing establishments.

C. Comparison between Connecticut and the United States

The main purpose of this subsection is to show that there are underlying structural differences between the Connecticut and United States labor markets. They do not appear to follow the same long run trends, they do not appear to have similar peaks and troughs, and there does not appear to be major peaks in job reallocation during 1996:Q4, 1997:Q4, and 2001:Q1 for the United States. Figure V-9 displays the first major difference between the U.S. and Connecticut labor markets in terms of job reallocation.

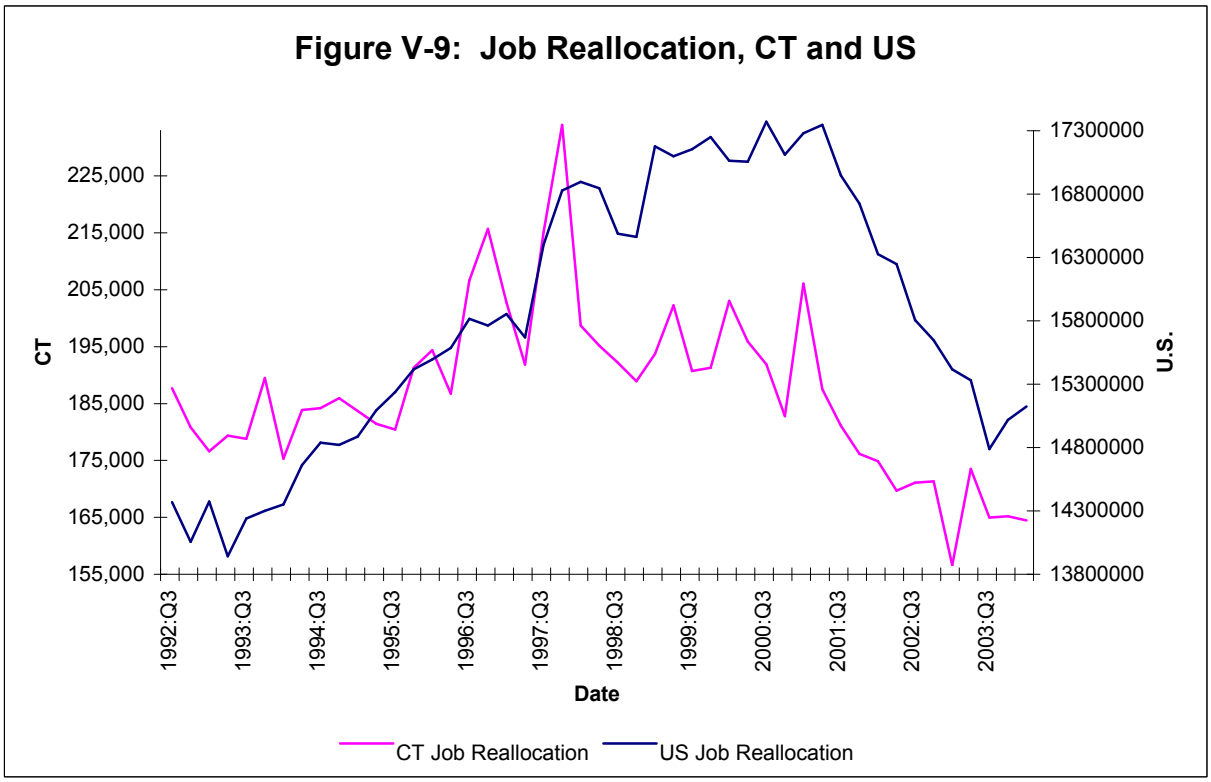
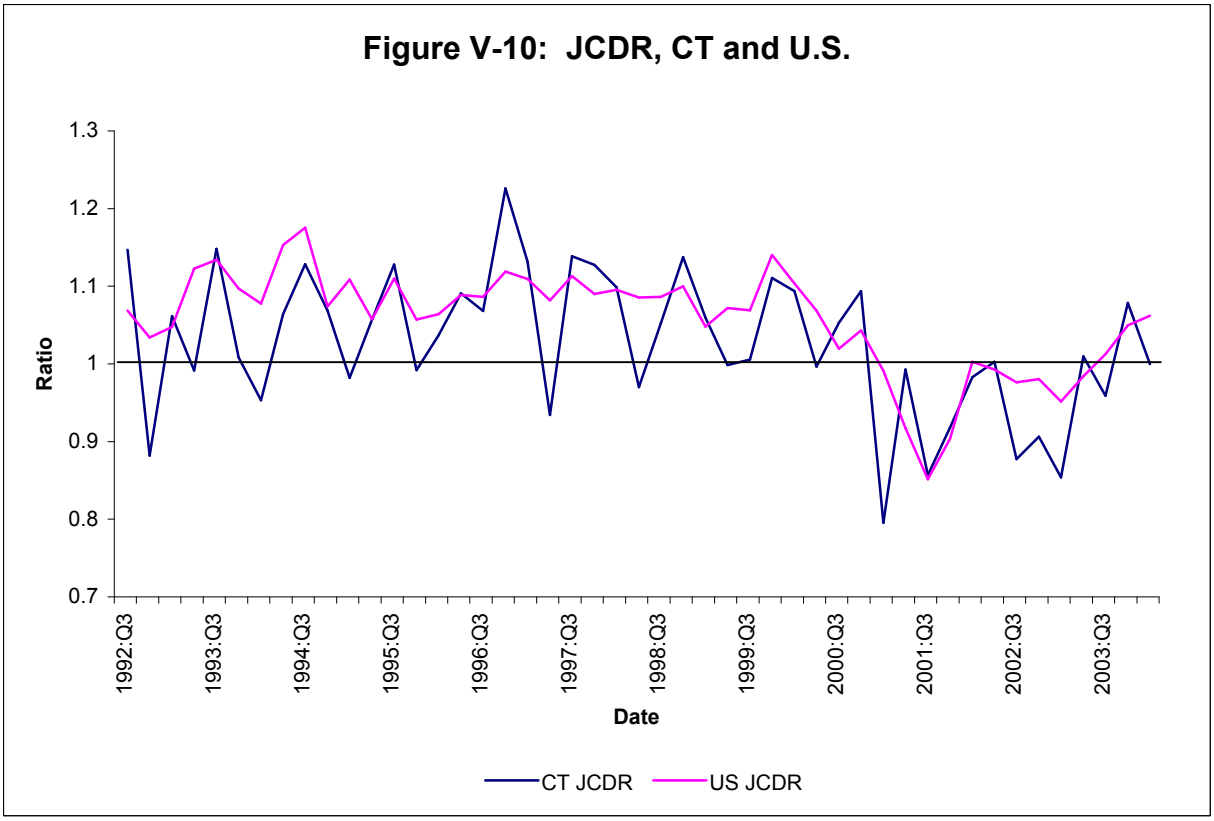


Figure V-9 shows that Connecticut experiences a modest upward trend from the period of 1992:Q3 through 1997:Q4. However, the United States appears to have a very sharp upward trend until 2001:Q1. This trend appears almost linear. Both times series have a noticeable downward trend that begins around the same time. The United States' job reallocation experiences a sharp decline during 2001:Q2, whereas Connecticut starts during 2001:Q1. As mentioned previously, Connecticut's correlation coefficient between job reallocation and job creation is larger than the correlation coefficient between reallocation and destruction. However, this is not the case for the United States. In fact, there is no statistical difference between the correlation coefficients for the U.S. The correlation coefficient between reallocation and creation is 0.88, and the coefficient between reallocation and destruction is 0.92. These two coefficients are not statistically significantly different from one another. This is the first

indication that the labor markets of Connecticut and the United States are structurally different from one another.

There are two other instances where these two labor markets are structurally different. The first is with the correlation coefficients between job creation and that job creation from expanding and opening establishments. We have already mentioned how there is no statistical difference between these coefficients for Connecticut. However, there is a statistical difference for the United States. The correlation coefficient for total job creation and that caused by expanding establishments is 0.97. The coefficient for total creation and creation from opening establishments is 0.81. These coefficients are statistically different from one another at the 5 percent level. This fact shows that the movements in total job creation in the United States have a stronger relationship to the movements of expanding establishments than opening establishments. We can tell a similar story concerning job destruction. Connecticut's correlation coefficient between total job destruction and that destruction caused by contracting establishments was not statistically different from the coefficient for total destruction and destruction from closing establishments. The coefficients are 0.69 and 0.79 for the former and latter, respectively. Despite the fact that there is no statistical difference between these coefficients, it is interesting to note that the coefficient for closing establishments is larger than the coefficient for contracting by one tenth. This is different from the United States. The coefficient between total destruction and destruction from contracting establishments is 0.98. The coefficient between total destruction and destruction from closing establishments is 0.89. These two are statistically different at the 5 percent level, indicating that movements in total job destruction are associated more with movements with destruction from contracting establishments than with closing establishments.

We make one final comparison between Connecticut and the United States, and this comparison deals with the JCDR, ER, and OR. Below, Figure V-10 plots the JCDR for Connecticut and the United States. The JCDR for the U.S. qualitatively exhibits the same two trends as the JCDR for Connecticut. The United States' JCDR appears to exhibit no upward or downward trend until 1999:Q4. However, in 1999:Q4, there is an immediate decline in the JCDR until 2001:Q3, after which there is an upward trend. This period of decline and recovery is not the same for Connecticut. Connecticut had no trend from 1992:Q3 until 2000:Q4. After 2000:Q4, the JCDR drops and then begins an increase until 2004:Q1.



The United States' JCDR dropped below one only ten times as compared to the twenty times for Connecticut. This means that while Connecticut experienced more job creation than destruction 60 percent of the time over this twelve-year period, the United States experienced more creation than destruction 79 percent of the time. The ten quarters when the United States experienced more job destruction than creation occurred between 2001:Q1 and 2003:Q2.

Like Connecticut, the United States' JCDR appears to move closer with the ER than the OR. The correlation coefficient between the United States' JCDR and ER is 0.98. The coefficient between the JCDR and the OR is 0.76. These two coefficients are statistically different at the one percent level. Table V-4 presents the variance of these ratios for the United States.

Table V-4: Variances of the U.S. JCDR, ER, and OR

Ratio	Variance	Variance to JCDR Variance
JCDR	0.0043	1.00
ER	0.0046	1.07
OR	0.0068	1.58

We can see that each of these ratios is less volatile in the U.S. than they are in Connecticut. In addition, the United States ER is more volatile than the JCDR, and the variance of the OR is not ten times larger than that of the JCDR.

Finally, Table V-5 is below. It is analogous to Table V-3, except that it represents the United States as opposed to Connecticut. One can see that there is still a slight decline in the U.S. JCDR and the OR when compared to the 1992:Q3 levels. However, the decline is not nearly as dramatic as for Connecticut. The United States JCDR has only decreased 0.6 percent, and the OR has only decreased approximately 5.3 percent. Unlike Connecticut, the United States ER actually experienced an increase of 0.8 percent from 1992:Q3. Therefore, the three indices show that the JCDR, the ER, and the OR have shown no serious long run increase or decrease over this twelve-year period. Table V-5 shows another major difference between Connecticut and the United States. As mentioned previously, Connecticut's JCDR reached its 1992:Q3 value only twice, which indicated that even though the number of jobs created were larger than the number of jobs destroyed 60 percent of the time, Connecticut has not been able to create more jobs than it destroyed at the same level as in 1992:Q3. This is not true of the United States. The JCDR for the nation reached or surpassed its 1992:Q3 level twenty-five times (54 percent). The ER reached or exceeded its beginning value twenty-six times (56 percent), and the OR reached or surpassed its 1992:Q3 value nineteen times (41 percent). This shows a stark difference between the United States and Connecticut labor markets.

Table V-5: Indexes of the U.S. JCDR, ER, and OR

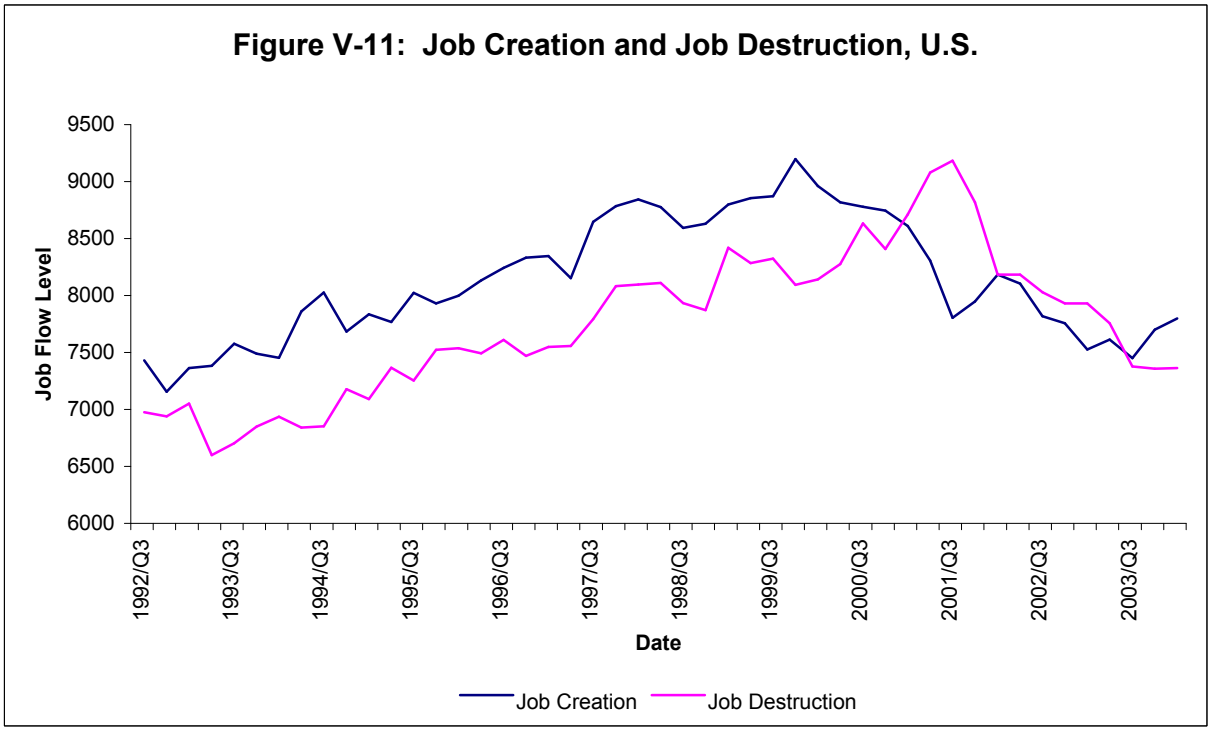
Date	JCDR	ER	OR	Date	JCDR	ER	OR
1992:Q3	100	100	100	1998:Q3	101.679	101.38	102.912
1992:Q4	96.776	94.63	105.355	1998:Q4	102.943	106.268	92.129
1993:Q1	98.03	96.004	104.12	1999:Q1	98.095	98.934	95.389
1993:Q2	105.102	107.183	98.213	1999:Q2	100.319	100.472	99.966
1993:Q3	106.166	105.109	110.898	1999:Q3	100.051	102.051	93.587
1993:Q4	102.684	102.373	104.499	1999:Q4	106.73	107.873	103.064
1994:Q1	100.88	101.514	99.044	2000:Q1	103.322	104.376	99.985
1994:Q2	107.95	108.737	105.486	2000:Q2	100.006	101.813	93.968
1994:Q3	110.053	107.706	120.475	2000:Q3	95.429	96.637	91.53
1994:Q4	100.511	100.916	99.544	2000:Q4	97.606	99.052	92.874
1995:Q1	103.781	102.883	108.152	2001:Q1	92.737	95.179	84.674
1995:Q2	98.991	97.907	103.719	2001:Q2	85.816	85.575	87.101
1995:Q3	103.881	105.231	99.512	2001:Q3	79.648	79.33	81.003
1995:Q4	98.945	98.517	101.048	2001:Q4	84.507	82.243	93.54
1996:Q1	99.6	98.727	103.421	2002:Q1	93.821	93.882	93.934
1996:Q2	101.931	101.588	103.673	2002:Q2	92.909	92.565	94.48
1996:Q3	101.679	100.206	107.584	2002:Q3	91.349	91.087	92.847
1996:Q4	104.725	103.4	110.12	2002:Q4	91.748	91.857	91.874
1997:Q1	103.838	103.835	104.214	2003:Q1	89.019	89.164	89.16
1997:Q2	101.26	101.697	100.121	2003:Q2	92.102	93.385	87.899
1997:Q3	104.187	106.115	97.966	2003:Q3	94.755	95.075	94.307
1997:Q4	102.036	105.329	92.003	2003:Q4	98.253	99.046	95.905
1998:Q1	102.549	103.194	100.316	2004:Q1	99.416	100.837	94.721
1998:Q2	101.589	100.374	105.458	-	-	-	-

Base Period = 1992:Q3

The data above could be indicative of structural differences between the labor markets of Connecticut and the nation. One could possibly expect these differences to occur because the

United States' figures are aggregates across all fifty states. However, we suspect that these differences might be more than just a result of a larger population over which to aggregate.

As mentioned in the introduction, the previous two recoveries experienced by Connecticut and the United States were jobless in nature. However, this is due to two different reasons. During the first recovery, not only was job creation high, but also was job destruction. In fact, both trended upwards. We can see this in Figure V-2 and Figure V-11, below.



During the recovery in the early 1990's, despite the fact that the number of jobs created in the economy was high, the number of jobs destroyed was also high. Therefore, the net change in jobs was very small. In the second recovery, the number of jobs destroyed was low and declined, but the number of jobs created was low and declined. This also resulted in a small net change in employment. These two experiences are atypical. Davis et al. (1996) mention that during a recession, job destruction rises, but then during a recovery it will typically fall. The authors also mention that job creation dips, but tends to remain high in recessions and recoveries. Therefore, from these two statements, one could infer that during the recoveries, the net change in employment should rise. However, there were structural differences in these two recoveries. During the recovery beginning around 1992, job destruction remained relatively high in the State and nation. During the most recent recovery, job creation declined along with job destruction. Since destruction fell during this recovery, then the abnormal behavior of this series during the earlier portion of the period is not much of a concern. However, job creation began to decline well before the most recent recession occurred. In fact, job creation began to fall during the fourth quarter of 1999 for the United States and 2000:Q1 for Connecticut. Since creation began to decline long before the recession took place, this could indicate a structural change within the

State and national economies. Faberman (2004) notes the same phenomenon. We will now begin the discussion of Connecticut's labor market dynamics over the business cycle.

VI. Connecticut's Employment Cycle: Post World War II Performance

A. Introduction

Before presenting a full discussion on Connecticut's employment cycle, we introduce some preliminary concepts.

Figure VI-1: Stylized Representation of the Connecticut Employment Cycle

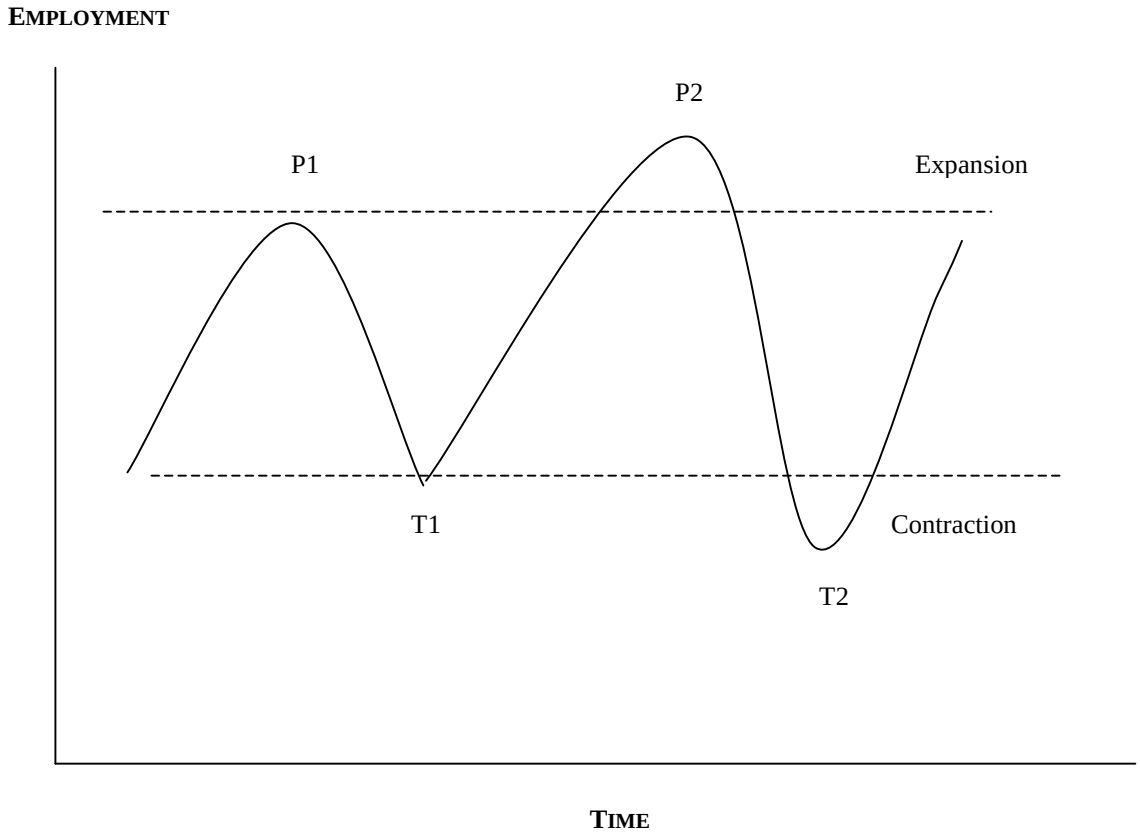


Figure VI-1 depicts a stylized representation of the Connecticut employment cycle. The vertical axis represents the level of employment, and the horizontal axis represents time. One could measure time in months, quarters, years, or even decades. For purposes of measuring and analyzing cycles, the most frequently used time period is a month; but quarters are also sometimes used. The *peak* represents the point where the level of employment is at its highest before turning down. In Figure VI-1, P1 and P2 represent two peaks. The *trough* is that point at which the level of employment has declined to its lowest point before turning up. In Figure VI-1, T1 and T2 represent two troughs. The region of the curve between P1 and T1 is where employment is declining. This is a *recession.* However, if the decline falls below the previous trough (as in the case of T2, which is below the dotted line labeled 'Contraction'), then the

employment cycle has entered the *contraction* phase. The phase in which employment turns up after the trough at T1 up to the dotted line labeled 'Expansion' (which is level with the peak at P1) represents the recovery of all the employment lost during the last recession. This is the *recovery* phase. If the level of employment surpasses the last peak, P1 (above the dotted line labeled 'Expansion'), as it does at peak P2, then the employment cycle is in the *expansion* phase. Now, the concepts are in place to discuss the measurement of a complete cycle.

There are two ways to measure a complete cycle. When we measure the complete cycle from peak-to-peak, then the cycle consists of the region between P1 and P2. However, if measurement is from trough-to-trough, then the cycle consists of the region between T1 and T2. Each approach measures one complete employment cycle. Table VI-1 presents the three major periods of Connecticut's Post World War II Era employment cycles, measured peak-to-peak. Table VI-2 presents the cycles measured from trough-to-trough. When measured peak-to-peak, there were nine complete cycles from March 1948 to July 2000. However, when measured from trough-to-trough, there were 10 cycles from October 1945 to September 2003. Which cycle measurement is preferred? The answer lies in practical considerations. For our purposes, those considerations dictate that the trough-to-trough approach is the best choice. Since the current recovery has not peaked at the time of writing, we used the trough-to-trough measurement of the complete cycles for the analysis presented in this paper.

To set the context for thinking about the dynamics of Connecticut's labor market over the Post Cold War Employment Cycle, this section provides a brief history of Connecticut's employment cycles and the changes in their characteristics since 1945. To capture the major economic events experienced by the World, U.S., and Connecticut economies, we partitioned the Post World War II Era into three major periods: the Post World War II-Cold War Period (1945-1970), the Post Bretton Woods-Cold War Period (1971-1989), and the Post Cold War Period (1989-Present).[7] We summarize the number of employment cycles and the measures of employment in each period of the cycles in Tables VI-1 and VI-2, below.

[7] A detailed discussion of the criteria used to partition the Post World War II Era can be found in Kennedy, Daniel W., Ph.D. "Jobs and Cycles: Historical Patterns in Connecticut's Employment Behavior," *The Connecticut Economic Digest*; November 2005.

Table VI-1: The Connecticut Employment Cycle: Complete Cycles Measured Peak-to-Peak Post World War II Era							
Period	P1	P2	P2-P1	Yearly Growth Rate	Jobs Gained-Lost/Mo	Length: Months	Length: Years
Post WW II-Cold War	Mar 1948-Feb 1970: 4 Cycles						
	780.6	1,210.90	430.25	2.02%	1,635.90	263	21.9
Post Bretton Woods-Cold War	Feb 1970-Feb 1989: 4 Cycles						
	1,210.90	1,677.50	466.6	1.73%	2,046.50	228	19
Post Cold War	Feb 1989-Jul 2000: 1 Cycle						
	1,677.50	1,695.50	18	0.09%	131.4	137	11.4
Entire Post WW II Era	Mar 1948-Jul 2000: 9 Cycles						
	780.6	1,695.50	914.9	1.49%	1,456.80	628	52.3
Source: Office of Research, Connecticut Labor Department							

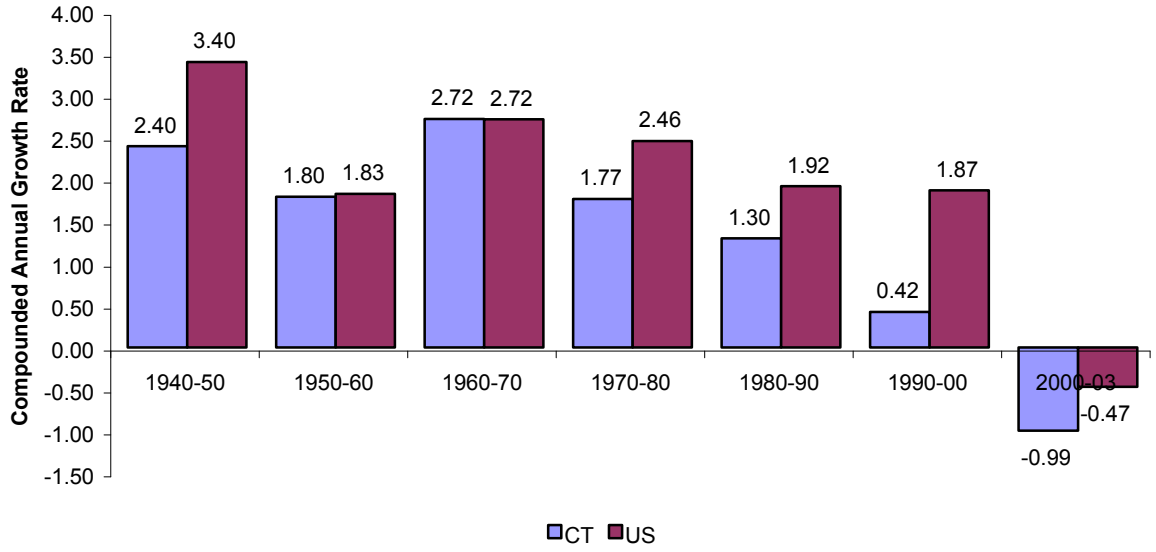
Table VI-2: The Connecticut Employment Cycle: Complete Cycles Measured Trough-to-Trough Post World War II Era							
Period	T1	T2	T2-T1	Yearly Growth Rate	Jobs Gained-Lost/Mo	Length: Months	Length: Years
Post WW II-Cold War	Oct 1945-Aug 1971: 5 Cycles						
	635.5	1,160.40	524.9	2.36%	1,693	310	25.8
Post Bretton Woods-Cold War	Aug 1971-Dec 1992: 4 Cycles						
	1,160.40	1,518.90	358.5	1.27%	1,401	256	21.3
Post Cold War	Dec 1992-Sep 2003: 1 Cycle						
	1,518.90	1,642.60	123.7	0.73%	958.9	129	10.8
Entire Post WW II Era	Oct 1945-Sep 2003: 10 Cycles						
	635.5	1,642.60	1,007.10	1.65%	1,449.10	695	57.9
Source: Office of Research, Connecticut Labor Department							

B. Connecticut's Employment Cycle: A Progressive Deterioration in Net Job Creation Performance

Over the Post World War II Era as measured from trough-to-trough, there were 10 cycles over 695 months, or 57.9 years (see Table VI-2). At the initial trough, Connecticut's level of nonfarm employment was 635,500; at the terminal trough it was 1,642,600. This represents a net increase of 1,007,100 jobs. Net employment growth averaged 1,500 jobs per month, or a 1.7 percent compounded annual growth rate. This snapshot of nearly 58 years masks the tremendous variation in the performance of Connecticut's employment cycle over different segments of the Post World War II Era. To get a more detailed picture, Figure VI-2 shows the compounded

annualized growth rate in nonfarm employment for the U.S. and Connecticut over the six decades from 1940 to 2000, and the 2000-2003 period.

Figure VI-2: Compounded Yearly Growth Rate in Employment, CT vs US: 1940-2000 and 2000-2003



During World War II, with a heavily defense-oriented manufacturing base, Connecticut grew at its fastest pace in the 1940's. The puzzle is that it was still one-percentage point below that of the U.S. At any rate, both the Connecticut and U.S. compounded annualized growth rates in employment slowed considerably during the 1950's. Connecticut's pace matched that of the U.S. (see Figure VI-2). In the 1960's, both Connecticut and the U.S. saw a surge in the employment growth rate, with a 2.7 percent-compounded annualized growth rate. Then, something significant happened to the Connecticut economy's ability to create jobs. Though the U.S. employment growth rate slowed after 1970, Connecticut's rate declined at a faster pace. During the 1990's, Connecticut had no new net employment growth, and between 2000 and 2003, Connecticut's relative decline was steeper than that for the U.S. This paper, while focusing on the last employment cycle in the Post World War II Era, will seek to explore some of the questions raised by the trends revealed in Figure VI-2 and those questions that are recently developing. The trends depicted in Figure VI-2 indicate that the Post World War II Era is far from homogeneous.

Three major, distinct periods emerged over the 1945-2003 period. The first, the Post World War II-Cold War Period, began with the end of World War II and lasted until the (unofficial) collapse of Bretton Woods in 1971. The Post Bretton Woods-Cold War Period spanned the turbulent 1970's and the back-to-back recessions in the early part of the 1980's up to the end of the Cold War. The Post Cold War Period begins in 1989, which coincides with the fall of the Berlin Wall. The following brief overview highlights the major milestones of each period.

The Post World War II-Cold War Period, measured from the initial trough in October 1945 to the terminal trough in August 1971, coincides with the year of the *de facto* end of the Bretton Woods System. There were five complete cycles within this period. The implication of employment in the terminal trough being 524,900 higher than in the initial trough is that each successive recession was less severe than the previous one. From the initial to the terminal trough, the level of employment increased by 1,700 jobs per month, or a compounded annual rate of 2.4 percent. This exceeded the growth rate for the entire Post World War II Era by 0.7 percentage points. This reflects the trends depicted in Figure V-2. This period covers part of the 1940's and all of the 1950's and 1960's. These decades saw the highest compounded growth rates for Connecticut employment.

The Post Bretton Woods-Cold War Period begins with the initial trough in August 1971 and ends with the terminal trough in December 1992. There were four complete cycles over this period. This period represents an important, pivotal point in the Connecticut economy's ability to generate employment. Coming off a larger base of 1,160,400 jobs, Connecticut added only 358,500 net new jobs, bringing the terminal trough level of nonfarm employment up to 1,518,900. Over the 256 months of the Post Bretton Woods-Cold War Period, the employment growth rate declined to 1,400 jobs per month. The annualized compounded growth rate fell 1.07 percentage points to 1.3 percent for the 21.3 years covering this period.

The Post Cold War Period begins with the trough of Connecticut's 'Great Recession' in December 1992. The terminal trough is the trough of the 'Millennial Recession' in September 2003. Over the Post Bretton Woods-Cold War Period, the Connecticut economy's employment growth rate slowed to a crawl when compared to the previous period. With the ushering in of the Post Cold War Period, the pace of Connecticut's employment creation slowed even further. At the initial trough, the level of Connecticut's employment was 1,518,900. At the terminal trough, Connecticut's employment level was 1,642,600, an increase of only 123,700 jobs. That translates into an anemic gain of 123,700 jobs over the life of this cycle. Connecticut added an average of 959 jobs per month over the 129 months between the initial and terminal troughs. The employment growth rate collapsed to 0.73 percent per year over the cycle's 10.8-year life. That represents a 0.54 percentage-point decline in the compounded annualized growth rate compared to the Post Bretton Woods-Cold War Period, 1.63 percentage-points below that for the Post World War II-Cold War Period, and 0.92 percentage-points below the compounded annualized growth rate for the entire Post World War II Era. An important clue to the Connecticut economy's performance over this cycle may lie in the nature of the recovery/ expansion phase. While the recovery part lasted for seven years (i.e. recovering all of the jobs lost in the previous recession [see Figure VI-1]), the expansion phase lasted a mere six months.

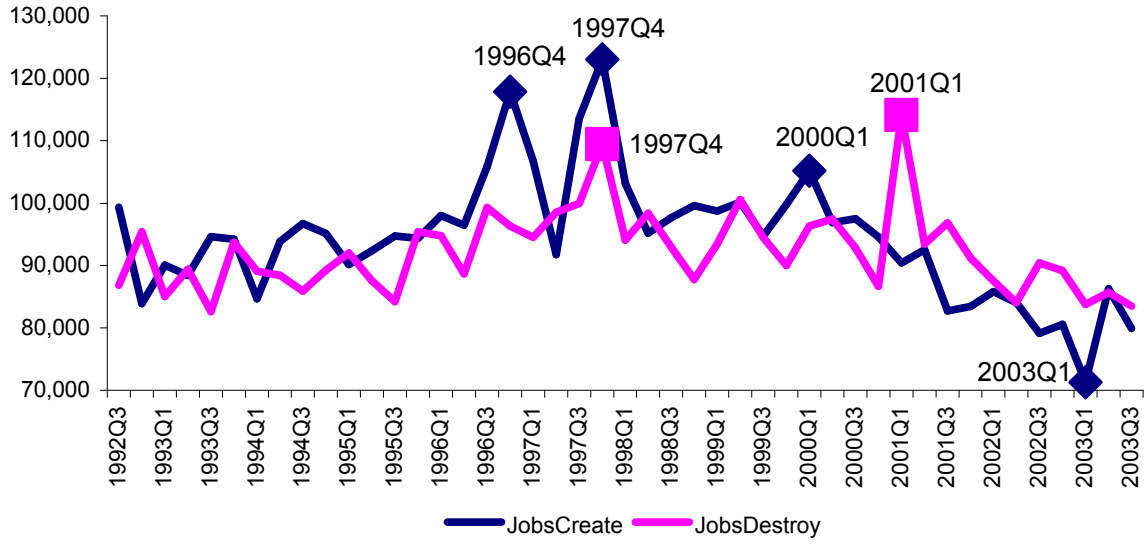
The above overview of the Post World War II Era provides the backdrop for investigating the dynamics of the Connecticut labor market. Recently available data from the QCEW now make it possible to explore the underlying dynamics of the labor market for the entire private sector. Previously, such data was only available for the manufacturing sector. Unfortunately, these data do not permit an investigation into the dynamics behind Connecticut's economic performance over the first two periods of the Post World War II Era. However, the data for the Post Cold War Period are available.

VII. The Cyclical Behavior of Connecticut's Labor Market Dynamics: Preliminary Findings

A. Job Creation and Destruction over Connecticut's Post Cold War Employment Cycle: Some Clues to Connecticut's Job Performance

Figure VII-1 plots the time series of the levels of job creation and destruction in Connecticut's economy over the Post Cold War Cycle. The horizontal axis plots the quarterly frequency of the data, and the vertical axis measures the level of job creation and destruction.

Figure VII-1: The Level of Job Creation vs. the level Job of Destruction, Connecticut's Post Cold War Cycle

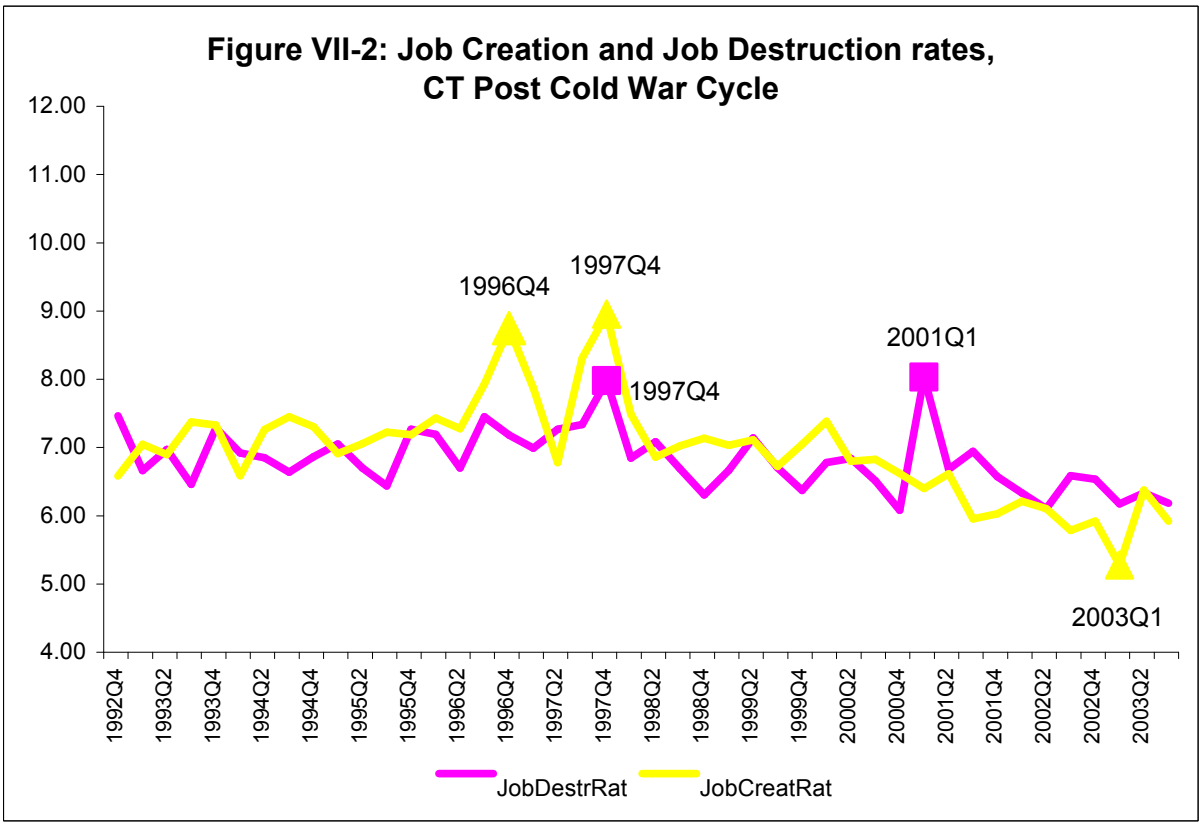


What catches the eye is that both job creation and destruction rise and fall together over the entire employment cycle. Both rise from the fourth quarter of 1992 (which contains the December 1992 trough), peak during 1997, and then decline as they approach the third quarter of 2003 (the quarter containing the September 2003 trough). Furthermore, their magnitudes are nearly identical. This is in line with what Davis et al. (1996) found in their analysis of job creation and destruction data for the U.S. manufacturing sector over the period from 1972:Q2 to 1988:Q4 period.[8] Given that this data is for Connecticut's private sector, not just the manufacturing sector, and it covers the period from 1992:Q4 to 2003:Q3, the agreement is remarkable. It extends the validity of their findings to a more broadly defined sector of a State-level economy over a different period. It also reinforces the questions they raised concerning the prevailing views on business cycles.

[8] See Davis et al. (1996), Chapter 2.

Another interesting feature exhibited by Figure VII-1 is the two large spikes in job creation: 117,851 in 1996:Q4 and 123,043 in 1997:Q4. The 1997:Q4 spike in job creation accompanied a simultaneous jump in job destruction (the second highest spike of the destruction data series) of 109,334. The last quarter of 1997 appears to be a period of intense economic activity. In 2000:Q1, there is another burst of job creation, which precedes the peak of Connecticut's Post Cold War recovery/expansion phase in July 2000 by one quarter. In addition to the 1997:Q4 spike, Connecticut's job destruction peaks to 114,087 in 2001:Q1, the period in which the U.S. recession officially began. Then, in 2003:Q1, two quarters before the trough of the 'Millennial Recession', there is a sudden drop in job creation to 71,287, the lowest level of job creation over the entire employment cycle.

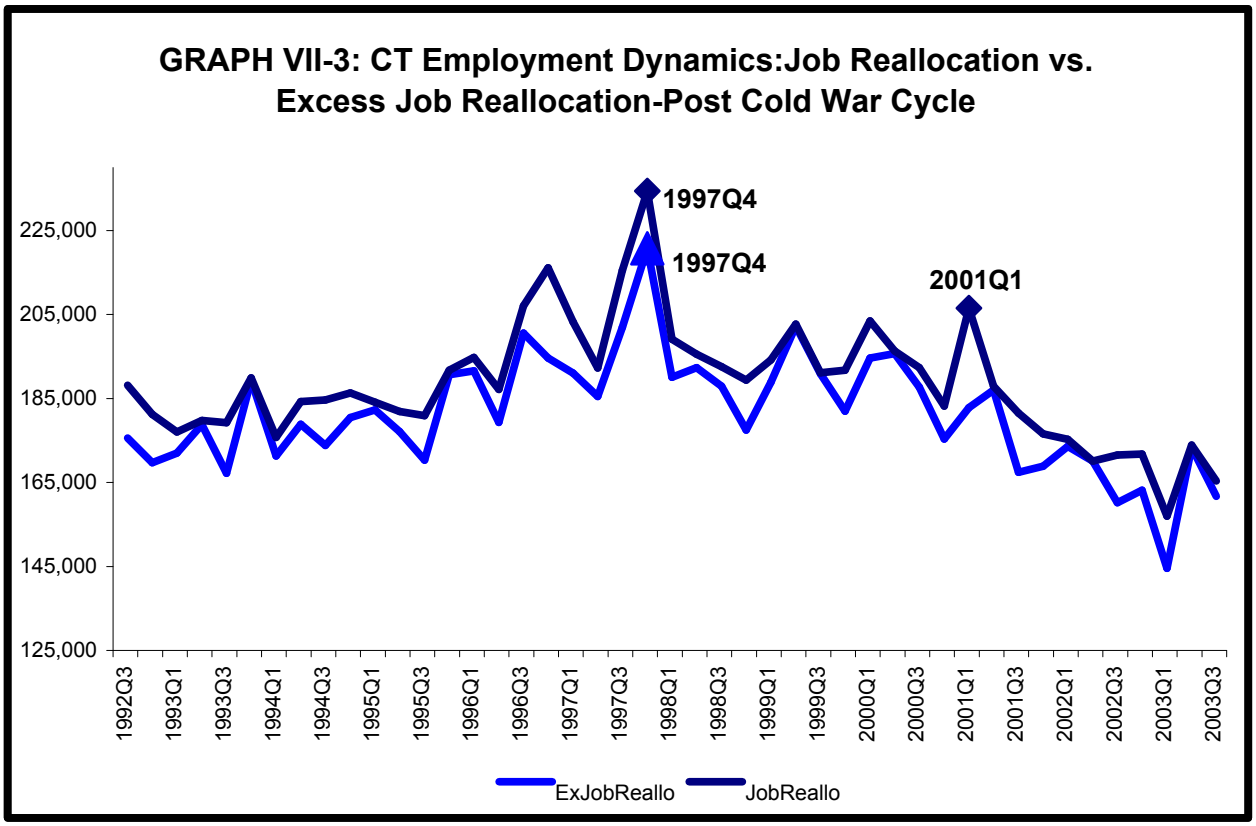
Figure VII-2 presents the job creation and destruction rates over the Post Cold War Employment Cycle. Note that the job creation *rate* does not spike in 2000:Q1 even through the *level* of job creation does (see Figure VII-1). However, the 1996:Q4 and 1997:Q4 spikes remain, as well as the sudden drop in job creation in 2003:Q1. For the job destruction rate, the spikes in 1997:Q4 and 2001:Q1 remain. Another difference between the time series plots in Figure VII-1 and VII-2 is the trend followed by the series over the Post Cold War Cycle.



The levels plotted in Figure VII-1 follow a quadratic trend that is rising from December 1992, peaking sometime in the last half of 1997, and then declining as the series approaches the end of the period in September 2003. In Figure VII-2, the plots of the two series follow a rather flat trend until the spikes in 1997. Both series then trend down. However, the slope of the job creation rate is steeper, and consequently, it falls below the job destruction rate in the fourth

quarter of 2000, which is one quarter after the peak of Connecticut's Post Cold War recovery/expansion.

Another relevant indicator of the dynamics of the labor market is the level and rate of *excess job reallocation*. This is a measure of reallocation intensity. Further, excess job reallocation corrects for the shortcomings of job reallocation. Excess job reallocation is job reallocation minus the absolute value of the *net employment change*.[9] Figure VII-3 plots job reallocation against excess job reallocation over the Post Cold War Period. After subtracting the net employment change from the job reallocation, two significant spikes remain in the excess job reallocation series: 1997:Q4 and 2001:Q1. Further, excess job reallocation exhibits the expected procyclical behavior.



Since, the majority of the remaining discussion will concentrate on rates rather than levels, we present a brief digression on the calculation of job flow rates that economists use in the job creation and destruction literature. This allows the investigation of relative changes in the dynamics of Connecticut's labor market. These rates also permit cross comparisons between different series of data and between Connecticut and the U.S. First, we introduce the calculation of the denominator.

[9] See Davis et al. (1996) page 13 for a discussion of excess job reallocation.

The denominator used to construct rates in this paper follows the construction used by Davis et al. (1996).[10] The conventional growth rate formula follows the following expression:

$$(E_t - E_{t-1}) \div E_{t-1} \quad (3)$$

Where:
E_t = Employment at time t.
$(E_t - E_{t-1})$ = Change in employment from time period t-1 to time period t.

The conventional growth rate expressed in equation (3) considers the birth of an establishment as corresponding to a growth rate of positive infinity, and it considers a plant death as corresponding to a growth rate of -1.00. However, because births and deaths represent symmetrical episodes surrounding the life cycle of an establishment, Davis et al. (1996) apply their unconventional method of calculating job flow growth rates. Their method of calculation binds the growth rate between -2.00 and 2.00, reflecting the symmetrical phenomenon of establishment births and deaths. We use the same formula as Davis et al. (1996) to calculate growth rates, and equation (4) expresses this formula as follows:

$$(E_t - E_{t-1}) \div [(1/2)*(E_t + E_{t-1})] \quad (4)$$

Where:
E_t = Employment at time t.
$(E_t - E_{t-1})$ = Change in employment from time period t-1 to t.
$(1/2)*(E_t + E_{t-1})$ = Average level of employment over time period t-1 to t.

With the unconventional formula expressed in equation (4), we return to the discussion of various job flow rates over Connecticut's Post Cold War Employment Cycle.

[10] See Chapter 2, especially page 26 and footnote 7.

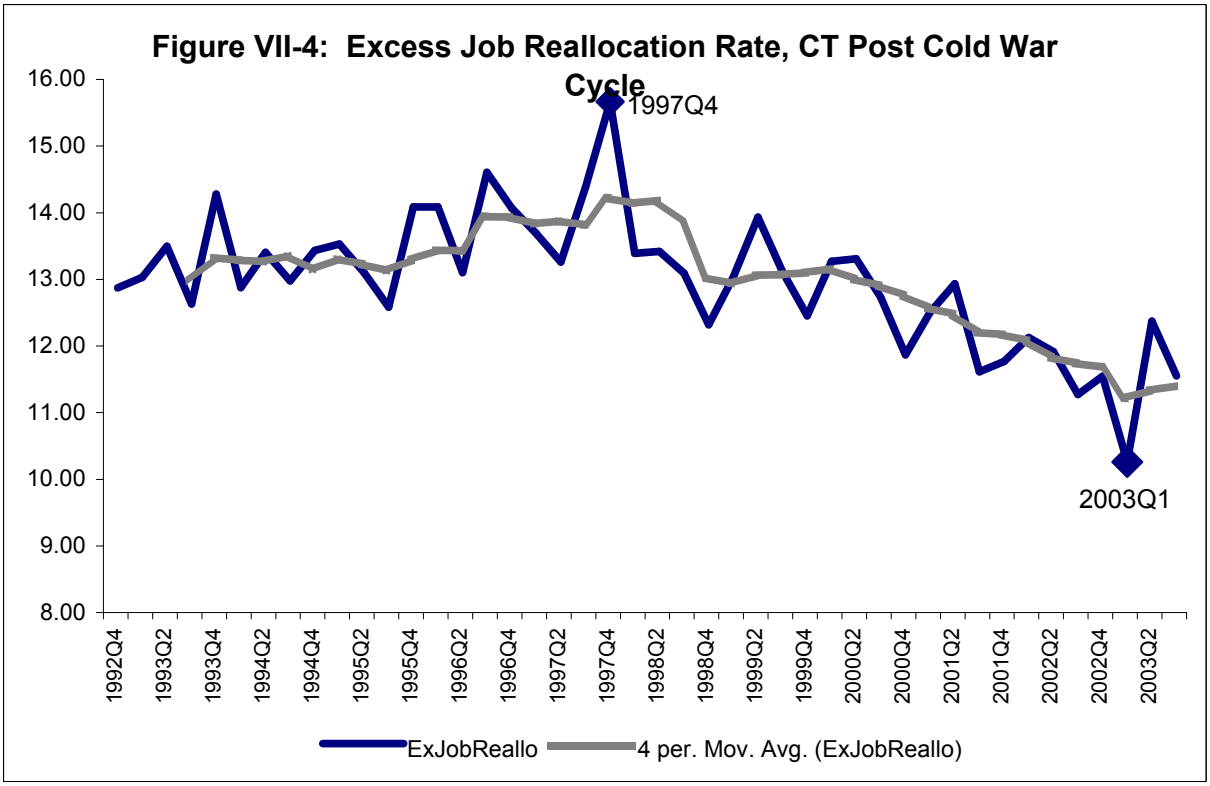
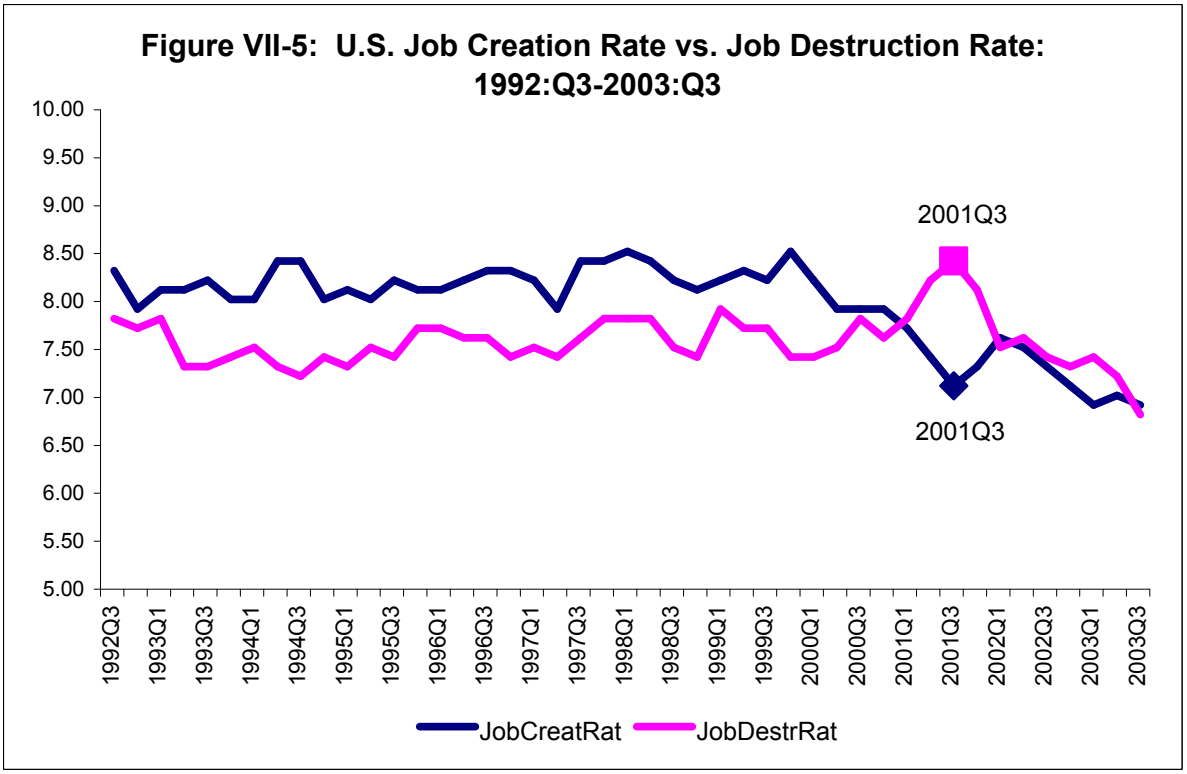


Figure VII-4 plots the time series of Connecticut's excess job reallocation rate and its four-period moving average over the Post Cold War Employment Cycle. Two of the spikes from Figure VII-3 remain: 1997:Q4 and 2003:Q1. Connecticut's recession in July 2000, (2000:Q3), explains the spikes occurring just before or after July 2000 up to the end of the period. The dip in the excess job reallocation rate in the first quarter of 2003, which is two quarters before Connecticut's trough, reflects this point. What is puzzling is the confirmation of what appeared in the time series plots in Figures VII-1 through VII-3, namely the spike in activity that occurred in 1997:Q4. Though the 1996:Q4 spike does not hold up from one plot to the next (especially when going from levels to rates), the 1997 spike consistently arises. In Figure VII-4, the excess job reallocation rate shows a surge in reallocation activity in the fourth quarter of 1997. As observed in the discussion on the job creation and destruction rates plotted in Figure VII-2, the only period in which the job creation and destruction rates spiked together was 1997:Q4. Plots of the U.S. job creation and destruction rates only raise more questions.



As depicted in Figure VII-5, no corresponding spike appears in either of the U.S. series over the period from 1992:Q4 to 2001:Q1. The sudden drop in the job creation rate and sudden spike in the job destruction rate occur simultaneously in the third quarter of 2001, one quarter before the official end of the 2001 recession. Further, the simultaneous increase in the rate of job destruction and decline in the rate of job creation took place during the recession. This is exactly the behavior one expects from both series over the recession phase of the cycle. Another difference in the behavior of the U.S. and Connecticut time series plots is in their overall relationships. The Connecticut job creation and destruction rates track each other closely over the entire period. The relationship between the two U.S. series is quite different. Until the first quarter of 2001, the official beginning of the 2001 recession, the job creation rate is consistently above the job destruction rate. It is only after the beginning of the recession that the job destruction rate passes above the job creation rate. Their spiking in opposite directions in the third quarter of 2001 follows this. Afterward, the job destruction rate does pass above the job creation rate, though they track closely. Thus, the simultaneous spiking of the job creation and destruction rates in the fourth quarter of 1997 appears to be a phenomenon specific to Connecticut. We discuss this more later.

TABLE VII-1: Correlation Matrix-CT and U.S. Job Creation and Destruction Rates, Connecticut's Post Cold War Cycle							
	US Job Creation Rate	US Job Destruction Rate	US Net Job Creation	CT Job Creation Rate	CT Job Destruction Rate	CT Net Job Creation	Time
US Job Creation Rate	1						
US Job Destruction Rate	0.0116	1					
US Net Job Creation	**0.8456**	-0.5239	1				
CT Job Creation Rate	**0.8001**	-0.015	**0.6896**	1			
CT Job Destruction Rate	0.3888	0.282	0.1807	0.5176	1		
CT Net Job Creation	**0.6556**	-0.2165	**0.674**	**0.797**	-0.1042	1	
Time	**-0.6695**	0.1167	**-0.6327**	-0.5587	-0.4041	-0.3642	1

Table VII-1 presents the correlations between the U.S. and Connecticut job creation and destruction rates and the time index. The first result to note is that over Connecticut's Post Cold War Employment Cycle, the Connecticut job creation rate and job destruction rate exhibit positive correlation (r = 0.52).[11] This is in contrast with the U.S., where there was no correlation between the job creation and destruction rates (r = 0.01). Both the Connecticut and U.S. job creation rates exhibited positive correlation with their respective net job creation rates (i.e. net employment growth rate) (r = 0.80 for Connecticut, and r = 0.85 for the U.S.). Connecticut's job creation rate showed positive correlation with the U.S. job creation rate (r = 0.80). Further, it showed positive correlation with the U.S net job creation rate (r = 0.69). This implies that Connecticut's net job growth moves in tandem with U.S. net job growth. There was virtually no correlation between the Connecticut job creation rate and the U.S. job destruction rate (r =-0.02). There was a negative correlation between Connecticut's job creation rate and the time trend (r = -0.56). This is not an encouraging result, for it implies that the job creation rate for Connecticut's economy declined over the cycle. However, the U.S job creation rate had a strongly negative correlation with the time trend over this period (r = -0.63), implying an even stronger downward trend in U.S. job creation.[12]

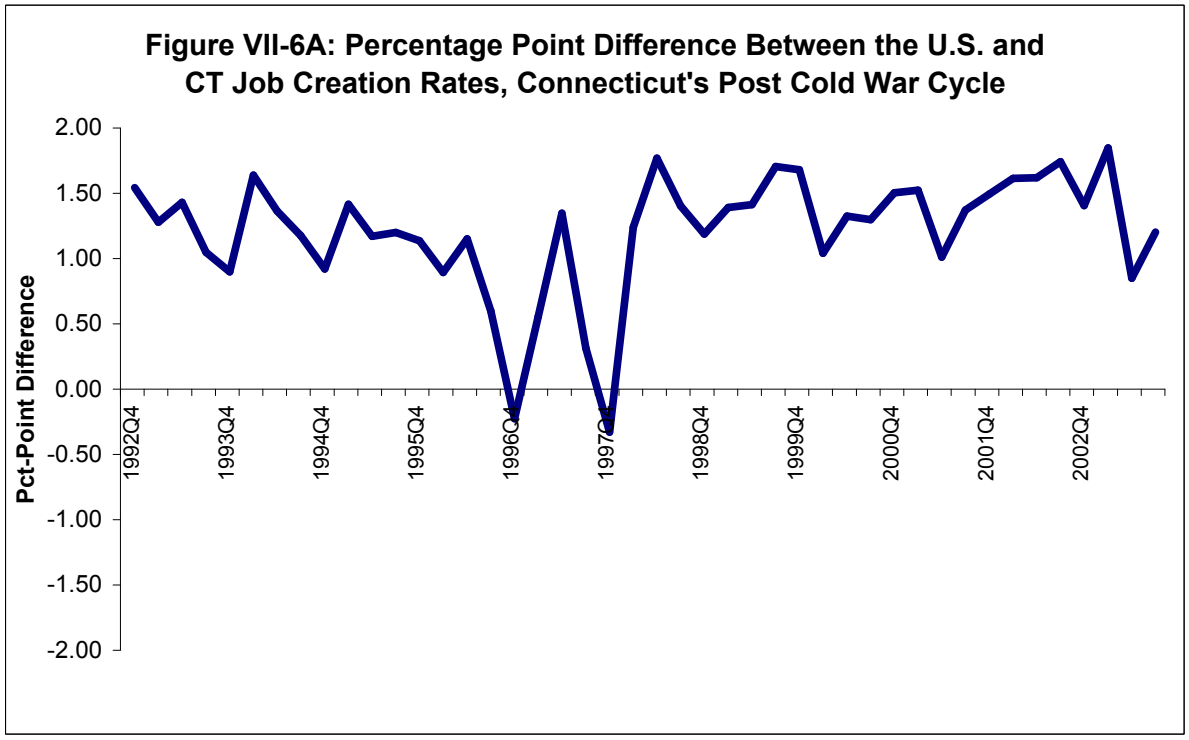
Interestingly, neither the Connecticut, nor the U.S. job destruction rates exhibit strong correlation with any of the other series in Table VII-1. There is a moderate, positive correlation between the

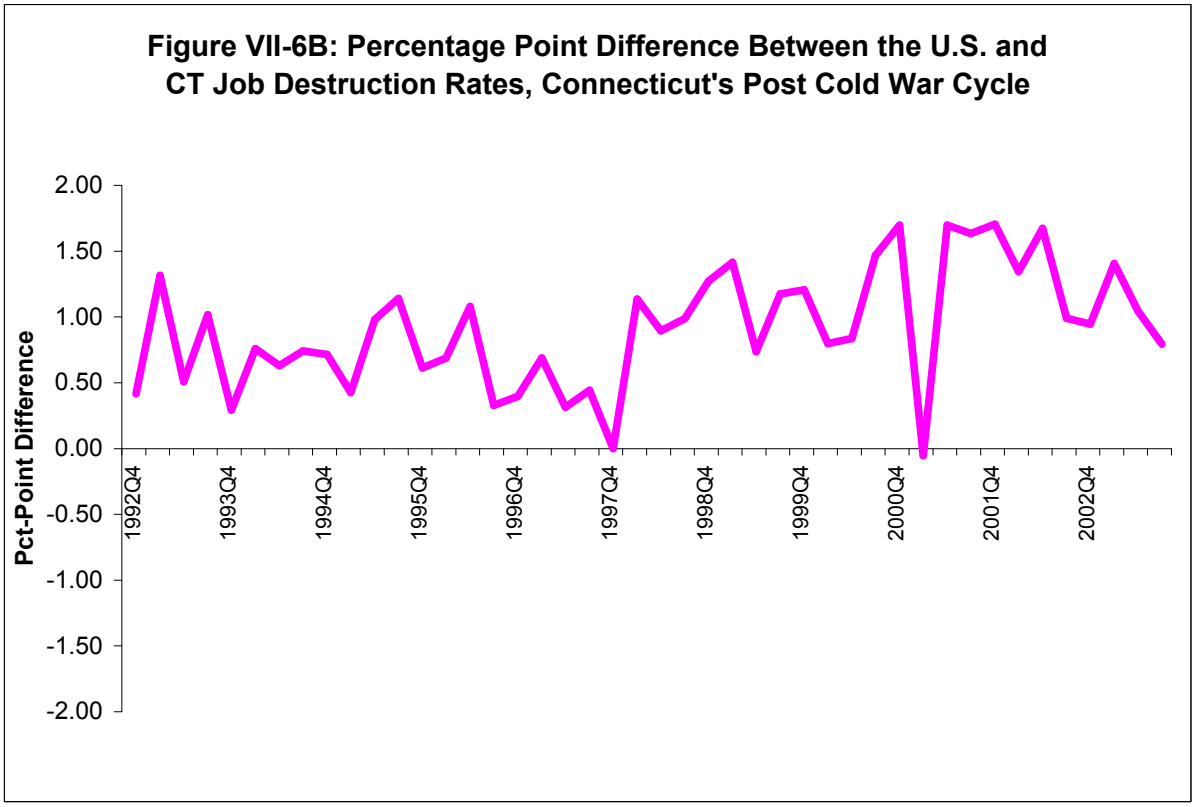
[11] r stands for the correlation coefficient.

[12] The fact that both the Connecticut and U.S. job creation rates are related to the time tend, as well as each to other, may bring up the issue of spurious correlation. A rule-of-thumb test for spurious correlation between two variables is if the product of their individual correlations with the time trend is close to their correlation with each other, then there is spurious correlation. In this case, their correlation with each other is 0.80, and the product of their correlations with the time trend is 0.37. Thus, spurious correlation does not appear to be a problem in this case (see Bails and Peppers, 1993 for a discussion of this issue).

Connecticut job creation and destruction rates and a weak, negative correlation between Connecticut's job creation rate and the U.S. job destruction rate. In addition, the U.S. job creation rate and the U.S. net job creation rate exhibit positive correlation. Figures VII-6A and VII-6B further explore some of the results in Table VII-1.

We derived the series plotted in Figures VII-6A and VII-6B by subtracting the Connecticut job creation and destruction rates from the U.S. job creation and destruction rates. Thus, those periods where the percentage point difference is positive indicates that the U.S. rate was higher than the Connecticut rate at that date, and a negative difference indicates that Connecticut's rate was higher at that point. We plotted both series separately so that clutter would not obscure the results.





The difference plotted in Figure VII-6A provides some interesting, preliminary information on Connecticut's flat job growth over the Post Cold War Cycle. The U.S.-Connecticut difference is positive throughout most of the period. The U.S. job creation rate averaged 1.14 percentage points higher than Connecticut's. Two notable exceptions reinforce two recurring themes throughout this analysis. Once again, 1996:Q4 and 1997:Q4 stand out. These are the only two periods where the U.S.-Connecticut difference is negative, indicating that the Connecticut job creation rate was above the U.S. rate.

From Figure VII-6B, it is apparent that the U.S. job destruction rate was above Connecticut's destruction rate throughout the Post Cold War Cycle. The U.S. rate averaged 0.90 percentage points higher. There are also two periods where Connecticut's job destruction rate passed above the U.S. rate. We explain the 2001:Q1 period by noting how Connecticut's employment cycle turned down two quarters before the national cycle. The first quarter of 2001 contained the month (March) that the NBER designated the beginning of the U.S. recession. However, once again, 1997:Q4 turns up. It was the first of only two times that Connecticut's job destruction rate exceeded the U.S. rate. Further, it was one of only two periods when the Connecticut job creation rate exceeded the U.S. job creation rate. Though both the U.S. job creation and destruction rates have been higher than Connecticut's corresponding rates (save the two anomalous periods noted above), the average differential in the creation rates is 0.25 percentage points higher than the average differential in the job destruction rates. This may provide an insight into the mystery of Connecticut's job creation performance lagging behind that of the U.S.

As shown in Table VII-2, the U.S.-Connecticut average job creation and job destruction differences are statistically different when conducting both the one and two tailed tests. Interestingly, there is no significant difference in their variances.

Table VII-2: Summary Statistics		
	U.S.-CT Percentage-Point Difference Between:	
Statistic	Job Creation Rates	Job Destruction Rates
Geometric Mean	1.14 Pct-Pts	0.90 Pct-Pts
Standard Deviation	0.4639 Pct-Pts	0.4571 Pct-Pts
Coefficient of Variation	40.53	50.85
Ho: $\mu_1 - \mu_2 = 0$*	Ho Rejected: t = 2.503; p-value = 0.007 (1-Tail)	
*Assumes equal variances	Ho Rejected: t = 1.663; p-value = 0.014 (2-Tail)	

The net result from job creation and job destruction is the *net job creation rate,* or *net employment growth rate.* This is the number typically reported by statistical agencies and picked up by the media. It is the sum of the period-to-period changes in employment by each individual establishment in the economy. Each establishment's net change is the result of *hires* subtracted by *separations* between the previous and current period. We express the net result as follows:

$$NET = H_{it} - S_{it} \quad (5)$$

Where:
H_{it} = Number of hires at establishment i in period t.
S_{it} = Number of separations (for any reason) at establishment i in period t.
If $H_{it} > S_{it}$ then $NET = JC_{it}$ (job creation) by establishment i in period t.
If $H_{it} < S_{it}$ then $|NET| = JD_{it}$ (job destruction) by establishment i in period t.

We derive net job creation (NJC) for the economy as follows:

$$NJC_t = \sum_i JC_{it} - \sum_i JD_{it} \quad (6)$$

We calculate the rates by dividing equation (6) by the denominator (D) defined in equation (4). Thus the rate form of equation (6) is:

$$NJCR_t = (\sum_i JC_{it})/D - (\sum_i JD_{it})/D = JCR_t - JDR_t \quad (7)$$

Where:
$NJCR_t$ = Net Job Creation Rate at time period t.
JCR_t = Job Creation Rate at time period t.
JDR_t = Job Destruction Rate at time period t.

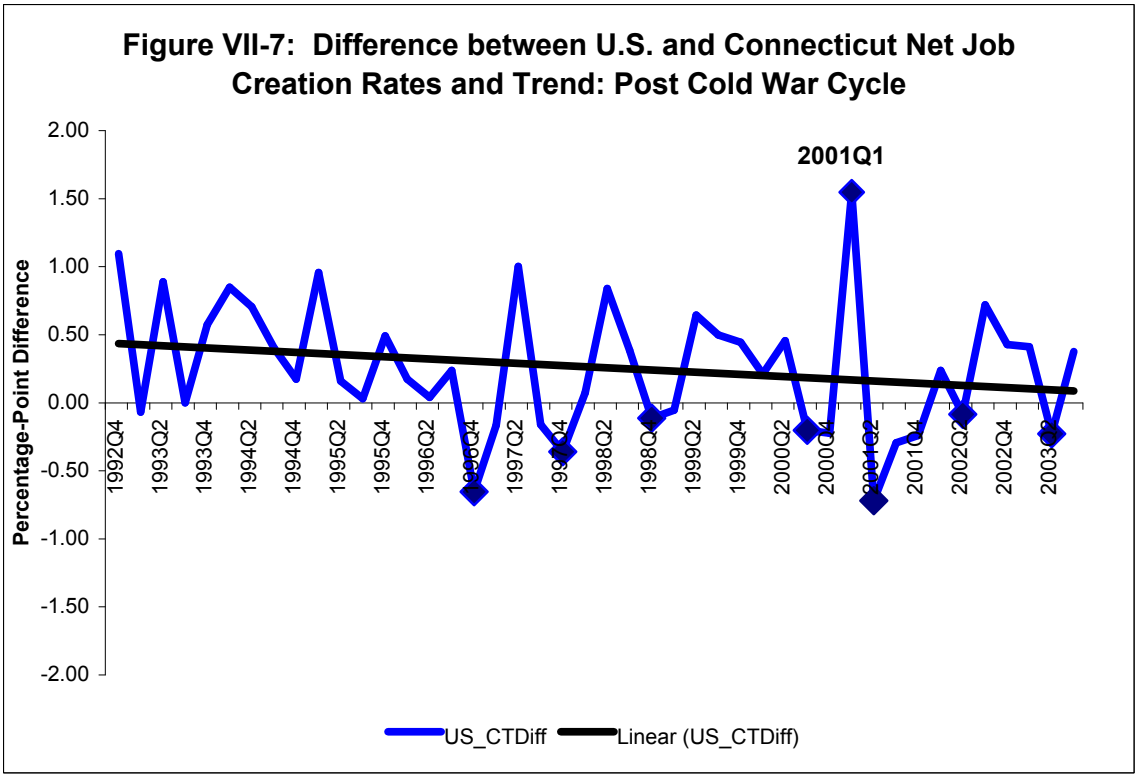
With the basic ideas in place, the discussion now turns to the trends in Connecticut's net job creation and how Connecticut's net job creation performance compares to that of the U.S. Table VII-3 presents correlations between the NJCR for the U.S. and Connecticut and time over the Post Cold War Cycle.

Table VII-3: Correlation Matrix: Time, Net Job Creation Rate, U.S. and CT

	Time	US NJCR	CT NJCR
Time	1.0000	--	--
US NJCR	**-0.6327**	1.0000	--
CT NJCR	-0.3642	**0.6740**	1.0000

From Table VII-3 it is apparent that the relationship between the Connecticut and U.S. net job creation rates is high (r = 0.67) and positive. The correlation does not appear to be spurious. If it is tempting to be reassured by the strong and positive association between the Connecticut and U.S. net growth rates in employment, their relationship with time should temper that reassurance. The high, negative association between time and the U.S net job creation rate (r = -0.63) and the lower, negative correlation (r = -0.36) between time and the Connecticut net job creation rate implies that the U.S. may be catching up with Connecticut's trend of flat net employment growth. If so, then the national economy would join Connecticut in producing almost jobless economic growth. These trends portend a *steady-state* labor market with little or no new net demand for labor. Within the current context, such a state would imply that job creation and job destruction would exactly offset each other. This produces no net job growth. The plot in Figure VII-7, below, offers supporting evidence to confirm the results in Table VII-3, which indicates that the U.S. job creation rate appears to be converging with Connecticut's rate.

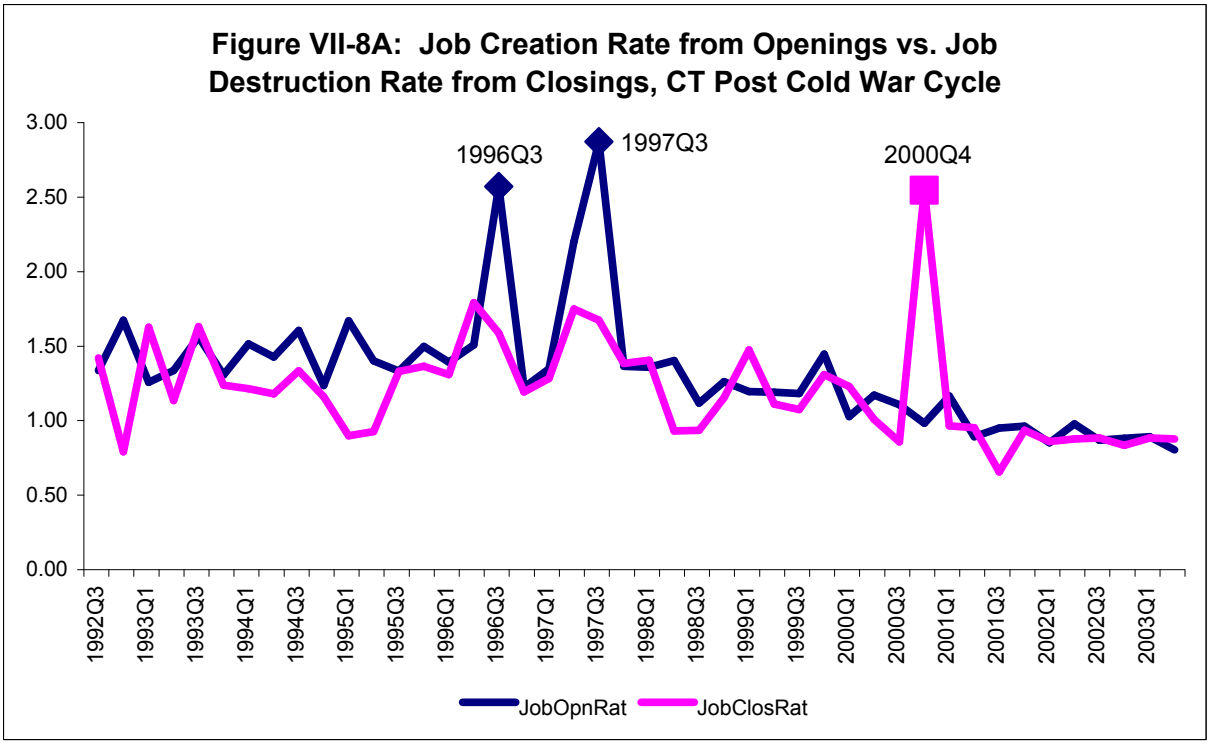
Figure VII-7 plots the difference between the U.S. and Connecticut net job creation rates, where we subtracted Connecticut's rate from the U.S. rate. A simple linear trend line also appears in Figure VII-7. Before 2000:Q3, negative points identified on the graph indicate those periods where Connecticut's net job creation rate exceeded the U.S. rate. After 2000:Q3, they indicate those points where the decline in the Connecticut net job creation rate was not as steep as the decline in the U.S. rate. One positive spike stands out from all others. It is the 1.53 percentage-point difference in the U.S. and Connecticut net job creation rates in 2001:Q1, the quarter designated by the NBER as the beginning of the U.S. 2001 recession. This represents a much steeper drop in Connecticut's net job creation rate. Over the first quarter of 2001, Connecticut's net change in employment contracted by 1.63 percent, compared to a 0.10 percent contraction for the U.S. This was the largest gap over the entire Post Cold War Cycle. Nevertheless, the 2001 spike notwithstanding, the trend line in Figure VII-7 offers further evidence for the convergence thesis suggested by the correlations between the Connecticut and U.S. net job creation rates and the time trend (see Table VII-3). From the beginning to the end of the period, the negatively sloped trend approaches the horizontal axis, which represents no difference between the U.S. and Connecticut net job creation rates. This implies convergence.

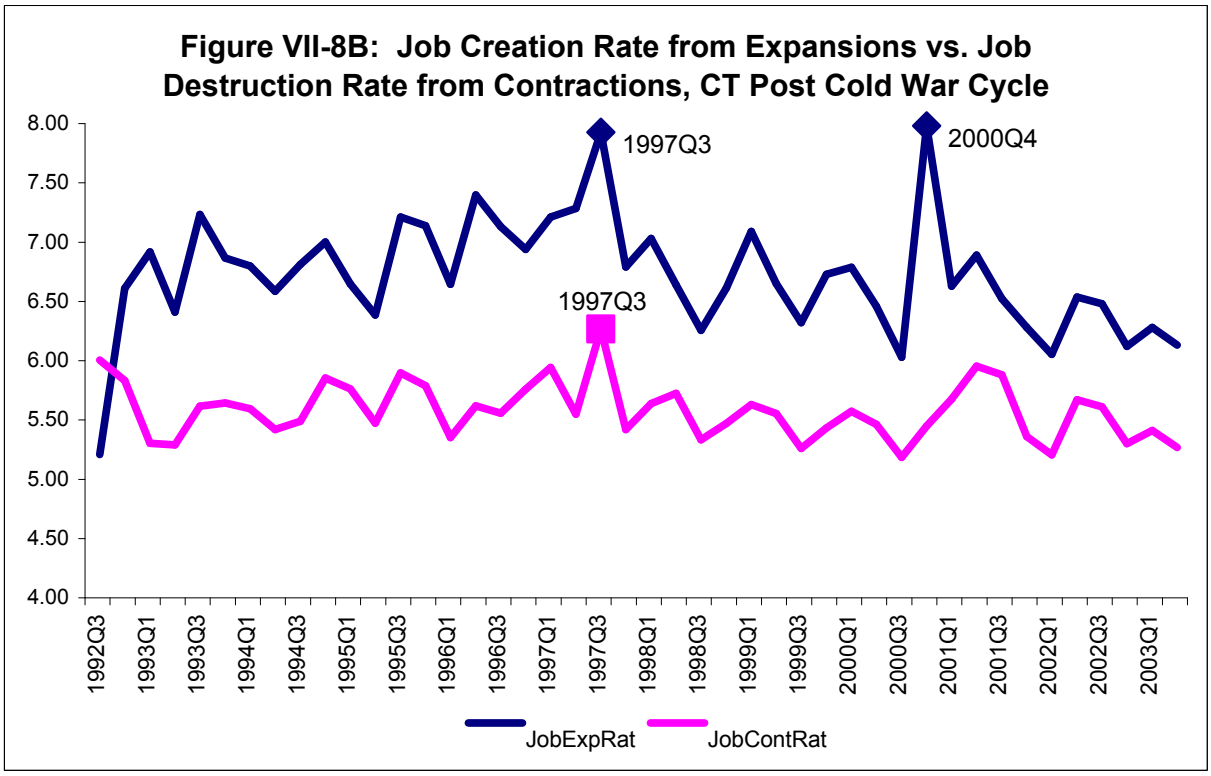


B. Sources of Job Creation and Destruction

Identification of the sources of job creation and job destruction in Connecticut's economy is important if one wishes to understand labor market dynamics. To that end, this section turns to the role of establishment openings, closings, expansions, and contractions in the dynamics of the labor market. Figure VII-8A tracks the job creation and destruction rates due to establishments opening and closing[13] for Connecticut over the Post Cold War Cycle. Figure VII-8B tracks the job creation and destruction rates due to establishments expanding and contracting.

[13] We note that the births and deaths of establishments are subsets of openings and closings. An establishment may close due to the suspension of seasonal operations or going dormant. However, in these cases, the establishment maintains a continuous UI tax account number. An establishment could also close because it is going out of business permanently (i.e. a death). The same would apply to openings. An establishment may re-open for the season, may return from dormancy, or open its doors for the first time (i.e. a birth).





Just as for the total job creation and destruction rates, the job creation and destruction rates from openings and closings track each other very closely over the Post Cold War Cycle, save at three notable periods. We identify two spikes in the job creation rate due to opening establishments in

Figure VII-8A: 1996:Q3 and 1997:Q3. The spike in the third quarter of 1997 preceded the fourth quarter 1997 behavior of interest noted above. The lone spike in the job destruction rate due to closings occurs in the fourth quarter of 2000, one quarter after the peak in Connecticut's recovery/expansion phase. However, it occurs at the same period (2000:Q4) in which there is a surge in the job creation from expanding establishments. Further, the lone surge in the job destruction rate from contractions in 1997:Q3 coincides with the spike in the job creation rate from expansions.

When examining Figures VII-8A and VII-8B, it is apparent that job creation from expansions behaved differently than job creation from openings, and job destruction from contractions behaved differently than job destruction from closings. Save the beginning point at 1992:Q3, the job creation rate due to expansions tracked significantly above the job destruction rate due to contractions. This is quite different from the behavior of the job creation and destruction rates due to openings and closings, respectively, which tracked each other closely. Unexpectedly, there is a surge in the job creation rate due to expansions in 2000:Q4, which is one quarter after Connecticut entered into a recession.[14] There is a spike in the job destruction rate due to closings in this same quarter. In an attempt to sort out some of the initial findings in Figures VII-8A and VII-8B, Figure VII-9, on the following page, tracks the net change in the *level* of employment. However, we express this level as the sum of two results: the net job change due to openings and closings (called net openings), and the net job change due to expansions and contractions (called net expansions). The sum of the two equals the total net job change. We present the definitions as follows:

> *Net job change due to openings* (net openings) is the difference between the number of jobs created from openings and the number of jobs destroyed from closings.
>
> *Net job change due to expansions* (net expansions) is the difference between the number of jobs created from expansions and number of jobs destroyed from contractions.
>
> *Total net job change* (i.e. net job creation) in private employment is the sum of net openings and net expansions.

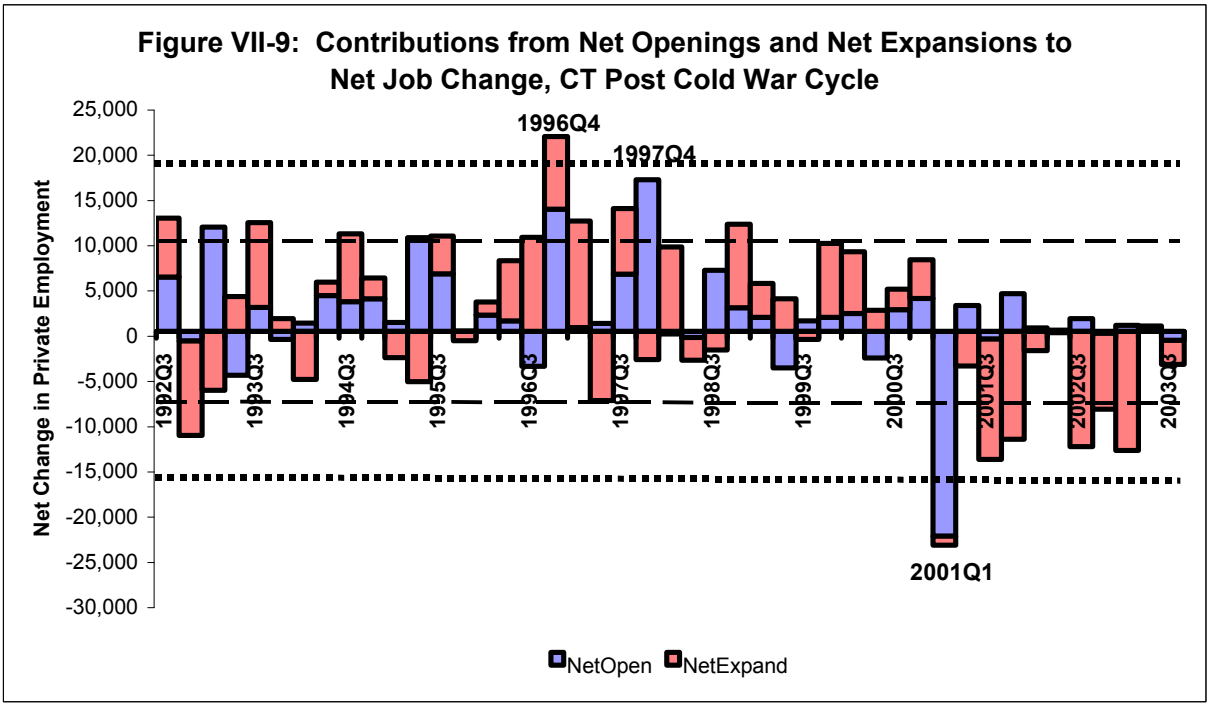
Figure VII-9 shows that Connecticut's average total net change in private employment was 2,086. The median change was 3,246. The largest net gain was 21,529, and it occurred in 1996:Q4. The largest net decline was 23,646, and it occurred in 2001:Q1. Those net changes that are in between the dashed lines in Figure VII-9 are greater than one standard deviation from the mean. Any change that is larger than two standard deviations from the mean lays beyond the dotted lines in Figure VII-9.

Period-to-period changes that are barely above one standard deviation from the mean occur in five periods: 1992:Q3, 1993:Q1, 1993:Q3, 1997:Q1, and 1998:Q4. Two periods in which net growth exceeded one standard deviation from the mean but was under two standard deviations are 1997:Q3 and 1997:Q4. Once again, the last half of 1997 stands out. However, the sources of net job growth appear to be different in these two quarters. In the third quarter of 1997, 47

[14] We base the timing of the recession on the downturn experienced by nonfarm employment.

percent of the net growth in jobs came from net openings; 53 percent came from net expansions. In the fourth quarter of 1997, net openings contributed almost 17,000 jobs to net growth; however, net expansions subtracted 3,000 jobs. These two forces lead to a net increase of 13,648 jobs. Clearly, there was a surge in job creation due to the opening of establishments in 1997:Q4, while existing establishments, on net, subtracted jobs from the economy.

Figure VII-9: Contributions from Net Openings and Net Expansions to Net Job Change, CT Post Cold War Cycle



Six periods had declines significantly above one but below two standard deviations from the mean. Aside from 1992:Q4, the remaining five points were between 2001:Q3 and 2003:Q1, which were periods during the most recent recession. There were two periods when the mean of the net change in private employment exceeded the two standard deviation threshold: 1996:Q4 exceeded two standard deviations in net growth of private employment, and 2001:Q1 exceeded two standard deviations in net contraction of private employment. Dramatic swings in creation and destruction from opening and closing establishments, respectively, drove the changes in both periods. In 1996:Q4, 63 percent of the 21,529 net jobs created were due to opening establishments. The fourth quarters of 1996 and 1997 represent the two largest increases in net job creation over the entire Post Cold War Employment Cycle. Moreover, job creation due to establishment openings drove the net changes in employment in both periods. Interestingly enough, net openings dominated the steepest contraction in net job creation over the Post Cold War Cycle (-23,646 in the first quarter of 2001). In this case, the net job change due to openings was –22,652, indicating that closing establishments drove the net decline. After the initial net decline in 2001:Q1, job destruction from contracting establishments drove the remainder of the periods with net declines up to the trough in 2003:Q3. In fact, net openings was positive in a few of these periods. However, the total net change was negative.

These results suggest a couple of observations about the recent recession. First, Connecticut's private sector employment declined two quarters after Connecticut's nonfarm employment turned down. Second, jobs eliminated through a rash of closing establishments drove the initial

shedding of private employment in the first quarter of 2001. Third, job destruction caused by contracting establishments played the dominant role in driving subsequent job losses for the rest of the recession. Thus, closing establishments initiated the downturn in private sector employment. However, contracting establishments eliminated more jobs than expanding establishments added, and this sustained the private sector downturn.

C. Job Flows over the Employment Cycle: Summary Findings

With the discussion in the previous two subsections, we now provide a summary of some of the major observations. Table VII-4A presents a summary of the characteristics of the distribution of Connecticut's job flows over Connecticut's Post Cold War Employment Cycle. We provide summary statistics on central tendency, spread (variation), shape, extreme values, and counts for the job creation rate (JCR), the job destruction rate (JDR), the job reallocation rate (JRR), and the net employment growth rate (NEG), which we also refer to as the net job creation rate and the net jobs change rate.

A first observation from Table VII-4A, is the relative closeness of the mean JCR and JDR. They differ by 0.14 percentage points. However, their median values are slightly farther apart (0.29 percentage points). Not surprisingly, the mean JRR is just under twice the size of the mean values of the JCR and JDR. The NEG averaged only 0.14 percentage points per quarter over the entire Post Cold War Cycle. To compare the spread or variation across series, the dimensionless coefficient of variation (CV) is the best statistic. Based on the CV, the NEG displays the greatest variation, with a CV of 466. Thus, the net growth rate in private employment can exhibit large swings from positive to negative growth over the cycle. The other three series display much less variation over the cycle. Interestingly, the JCR displays the most variation of the gross job flow measures over the cycle. Further, the JDR has the least variation over the cycle. This confirms, quantitatively, the observation in Figure VII-2. In other words, over the cycle, job creation played the more active role in determining whether or not the net change in employment was positive (growth) or negative (contraction).

Table VII-4A: Summary Statistics: Job Flows over Connecticut's Post Cold War Employment Cycle

Characteristics	JCR	JDR	JRR	NEG
Central Tendency				
Mean	6.8	6.66	13.46	0.14
Median	6.87	6.58	13.47	0.14
Mode	--	--	--	--
Spread (Variation)				
Variance	0.54	0.2	1.09	0.4
Standard Deviation	0.74	0.45	1.04	0.63
Coefficient of Variation	10.85	6.72	7.75	466.19
Range	3.68	1.95	5.48	3.2
Shape				
Kurtosis	0.9859	0.5751	1.3144	0.3977
Skewness	0.3997	0.6623	0.4774	-0.4383
Extremes				
Minimum	5.11	5.92	11.13	-1.63
Maximum	8.79	7.87	16.61	1.57
Count				
N	44	44	44	44

Tables VII-4B and VII-4C present the same summary statistics in Table VII-4A, but for the recovery/expansion phase of the cycle (Table VII-4B) and the recession phase (Table VII-4C). The first result to note is the increase in the mean JCR in the recovery/expansion phase when compared to the recession phase. The mean JCR was 7.12 for the 1992-2000 recovery/expansion. However, it fell to 5.99 over the recent recession, representing a decline of 1.13 percentage points. The average JDR over the recovery/expansion phase was 6.76. Counter intuitively, the average JDR also fell. The JDR declined by 0.38 percentage points during the recession, though the decline was smaller than that for the JCR. The larger decline in the JCR combined with the smaller decline in the JDR resulted in the average NEG falling from 0.34 during the 1992-2003 recovery/expansion to -0.39 during the 2000-2003 recession. This is a 0.73 percentage point decline. The JRR averaged 13.88 during the recovery/expansion and 12.38 during the recession phase. This 1.50 percentage point decline represents a slowing of job flow activity in the recession phase of the cycle. All of the noted behavior in the JCR and JDR imply that a loss of dynamism characterizes an economy going into recession. In other words, there is a decline in all job flow activity as the economy moves from a state of intense churning to a state of slower churning.

Table VII-4B: Summary Statistics: Job Flows over Connecticut's Post Cold War Recovery/Expansion Phase

Characteristics	JCR	JDR	JRR	NEG
Central Tendency				
Mean	7.12	6.76	13.88	0.34
Median	7	6.69	13.68	0.38
Mode	--	--	--	--
Spread (Variation)				
Variance	0.31	0.14	0.64	0.26
Standard Deviation	0.56	0.37	0.8	0.51
Coefficient of Variation	7.86	5.45	5.76	143.13
Range	2.37	1.67	3.6	2.45
Shape				
Kurtosis	2.6158	0.6575	3.6762	0.337
Skewness	1.5849	0.6304	1.8278	-0.1328
Extremes				
Minimum	6.42	6.15	13.01	-0.88
Maximum	8.79	7.82	16.61	1.57
Count				
N	32	32	32	32

Table VII-4C: Summary Statistics: Job Flows over Connecticut's Millennial Recession				
Characteristics	JCR	JDR	JRR	NEG
Central Tendency				
Mean	5.99	6.38	12.38	-0.39
Median	5.94	6.35	12.28	-0.26
Mode	--	--	--	--
Spread (Variation)				
Variance	0.17	0.26	0.51	0.36
Standard Deviation	0.42	0.51	0.72	0.6
Coefficient of Variation	6.93	8.04	5.79	-154.71
Range	1.55	1.95	2.98	2.17
Shape				
Kurtosis	0.3608	6.1283	2.3233	0.034
Skewness	-0.3401	2.2336	0.8929	-0.4738
Extremes				
Minimum	5.12	5.92	11.13	-1.63
Maximum	6.67	7.87	14.11	0.54
Count				
N	12	12	12	12

It is not just that there is a shift in the location of the JCR, JDR, JRR, and NEG distributions when the economy moves from the recovery/expansion phase to the recession phase of the cycle. All three distributions also changed shape when moving from one cyclical phase to another. This will have implications for the discussion of job flow behavior and business cycle theory discussed in the following section. The shapes of the JCR and JRR distributions change in opposite directions than the JDR distribution over the different phases of the cycle. The shape of the NEG distribution changes only slightly over the phases of the cycle. One can see this by observing the changes in the values of the shape statistics in Tables VII-4B and VII-4C. Of particular interest is the skewness statistic.[15] Since skewness (SK), like the CV, is a dimensionless number, we use it for making comparisons across distributions. For the JCR, its SK went from 1.5849 during the recovery/expansion phase to -0.3401 during the recession phase. To understand the implications of this, one must understand the relationship between the mean and median. Over the recovery/expansion phase (Table VII-4B), the mean JCR was 0.12 percentage points larger than the median. This implies that there were large values to the right of the mean. Thus, the distribution exhibits rightward skewness. This, in turn, implies that there were periods when values of the JCR were quite large, indicating surges in job creation during the recovery/expansion phase. We verify this by examining the maximum value of 8.79 in Table VII-4B and the spikes observed in Figure VII-2 occurring at 1996:Q4 and 1997:Q4 (both periods in the recovery/expansion phase). Besides the decline in the value of the mean in the recession phase, it is still larger than the median. However, the gap is now only 0.04 percentage points. The SK value of -0.3401 implies that the distribution exhibits leftward skewness. The minimum

[15] The Skewness statistic measures the symmetry of the distribution. It is calculated as:
SK = {n/[(n-1)*(n-2)]}*∑[(x - μ)/s]^3, Where: μ= mean, n = sample size, and s = standard deviation. MS Excel97, Microsoft Corporation, Redmond, WA.

value is now 5.12, which is lower and to the left of the minimum value in Table VII-4B. The same result is true for the maximum value in Table VII-4C as compared to its counterpart in Table VII-4B. In Figure VII-2, one can identify larger values to the left of the mean in the recession phase at the point for 2003:Q1.

As the economy moves from the recovery/expansion to the recession phases of the employment cycle, the distribution of the JDR displays behavior that is the opposite to that of the JCR. The JDR distribution goes from being slightly skewed to the right over the recovery/expansion phase to being extremely skewed to the right (SK=2.2336) over the recession. In fact, the JDR has a larger SK during the recession phase than either of the JCR or JRR distributions over both phases of the cycle. Even more interesting, the minimum value of the JDR actually falls from 6.15 to 5.92 when going from the recovery/expansion to the recession phase; and the maximum value only increases by a mere 0.05 percentage points, from 7.82 to 7.87. Again, these facts reinforce the earlier observation that an economy loses its dynamism when it enters into a recession.

The JRR, which is an indicator of the economy's general job flow activity, is highly skewed to the right over the recovery/expansion phase of the cycle. Its mean value exceeds the median by 0.20 percentage points (see Figure VII-4, which depicts the positive spike in the JRR in 1997:Q4). As the economy loses its dynamism and transitions from recovery/expansion to recession, the mean-median differential declines to 0.10 percentage points, and the JRR distribution becomes more symmetric, for the skewness value falls from 1.8278 to 0.8929. Further, the minimum and maximum values decline by 1.88 and 2.50 percentage points, respectively, reflecting the contracting job flow activity as the economy sinks into recession.

The net result of the interplay between job creation and destruction is the net change in employment, NEG. The behavior of the NEG over the phases of the cycle is not surprising given Connecticut's flat job growth performance over the Post Cold War Cycle. The NEG distribution is skewed slightly to the left over both the recovery/expansion and recession phases of the cycle. The distribution becomes negatively skewed over the recession phase. The next section explores the implications of the findings reported in this section for the prevailing view on business cycles.

VIII. Connecticut's Labor Market Dynamics and Business Cycle Theory

A. Introduction

The prevailing macroeconomic view on business cycles centers its focus on the idea that recessions are driven by exogenous, aggregate shocks to the economy that affect firms mostly at the same time resulting in a broad reduction or expansion in output and employment. The focus on aggregate shocks leads economists to adopt a macroeconomic framework characterized by *representative agent* models. In these models, researchers use a representative firm, which is the average, or composite, of all firms in the economy, to model the production sector. Likewise, researchers use a representative household to model the behavior of all members on the consumption side of the economy. This framework assumes that all producers are the same and all consumers are the same. Thus, the model abstracts from differences in business cycle

behavior among households and firms across and within sectors. With its blindness to differences among households and firms, the representative agent framework reinforces the prevailing view's focus on aggregate shocks, which obscures the flurry of not only inter-sectoral reallocation activity, but also intra-sectoral reallocation activity.[16]

There have been a number of criticisms of the prevailing view on business cycles that have come from the macroeconomic perspective, such as those of Hahn and Solow (1997), Fair (1994, 2001), and Schenk-Hoppe' (2001).[17] The forecast failure literature has presented results contradicting the predictions of the prevailing view (Hendry, 2002). The labor economics literature also makes its own criticism (Hamermesh, 1993). In addition, over the last decade or so, studies of labor market dynamics have put forth further criticisms of the prevailing view. These criticisms offer a different perspective from which to view the prevailing view on business cycles.

Newly created longitudinal databases have been experiencing growth in the availability of data on the openings, closings, expansions, and contractions of establishments and the creation and destruction of jobs. Using these databases, researchers are gaining a, heretofore, unavailable insight into the processes that drive the observed outcomes on the surface of the economy. Empirical evidence from newly available longitudinal databases calls the assumption of homogeneity between agents into question.[18] As noted above, it is this assumption of agent homogeneity that drives the prevailing macroeconomic view of business cycles. Further, the prevailing view assumes frictionless resource reallocation and constantly clearing markets, which do not appear to be a set of reasonable assumptions.

In their landmark work, Davis et al. (1996),[19] using data on the U.S. manufacturing sector from the U.S. Census Bureau's quinquennial Census of Manufacturers and Annual Survey of Manufacturing, reported several regularities that they observed in the cyclical behavior of job flows. Since then, further research has followed up on and extended Davis et al.'s (1996) results (for example, see Figura, 2001, Davis, Faberman, and Haltiwanger, 2005, and Hauzenberger, 2005). These observations called into question the prevailing view on business cycles.

Davis et al. (1996) note that the prevailing view on business cycles suggests four predictions concerning the behavior of gross job creation and destruction:[20]

1. The correlation between the job creation and destruction rates is close to -1.00.
2. The changes in creation and destruction over the business cycle are of opposite sign, but roughly equal in magnitude
3. The variability of creation and destruction rates over time is similar in magnitude.
4. The correlation between the job reallocation rate and the net employment growth rate is close to zero.

[16] This occurs whether shocks are endogenously, exogenous, or both.
[17] See Stadler (1994) for an explanation with criticisms of real business cycle theory.
[18] Results from newly available longitudinal databases have resulted in reassessing assumptions made in branches of economics other than labor economics and business cycle theory, such as industrial organization (for instance, see Caves, 2003).
[19] This discussion draws heavily on Chapter 5.
[20] Ibid. p. 90-91

One should empirically observe the above four predictions if aggregate shocks dominate economic activity and have similar growth rate effects on all, or most, employers. Further, though such shocks should shift the central tendency of the growth rate distribution, they should have little effect on the shape of the distribution.

B. Connecticut's Job Flows over the Post Cold War Cycle: Some Initial Findings

Recall that Davis et al. (1996) utilized manufacturing data. A follow up study by Hauzenberger (2005) also used manufacturing data. Both studies contradicted the predictions of the prevailing view on business cycles. Also, recall that our study utilizes data on the entire private sector of the U.S. and Connecticut economy. Therefore, our study builds upon the Davis et al. (1996) and Hauzenberger (2005) studies.

Our results reinforce the findings of Davis et al. (1996) and Hauzenberger (2005) in the respect that they question the prevailing view of business cycles. However, in many instances, our results disagree with Davis et al. (1996) and Hauzenberger (2005). Frequently, magnitudes are significantly different, and many statistical relationships have the opposite sign of those obtained by Davis et al. (1996) and Hauzenberger (2005). Differences apparently result from the scope of the data used in each of the studies (manufacturing versus the entire private sector), and the periods studied (1972:Q2 to 1993:Q4 versus 1992:Q4 to2003:Q3). The periods included in both sets of studies become particularly critical, as our study includes the period which experiences significant structural shifts in the U.S. and World economies as the 20th Century gave way to the 21st.

We base the majority of the discussion in this subsection on the results presented in Tables VIII-1 and VIII-2. The correlations appearing in Table VIII-1, for Connecticut, and Table VIII-2 for the U.S. are for the entire private sector of the Connecticut and U.S. economies. This includes the manufacturing sector. Both tables cover the entire Post Cold War Employment Cycle for Connecticut.

Table VIII-1: Correlations between Job Flows for CT over Connecticut's Post Cold War Employment Cycle and its Phases

Correlation between Rates of:	Post Cold War Cycle (N = 44)	Expansion (N = 32)	Recession (N = 12)
JCR and NEG	0.80**	0.77**	0.45
JDR and NEG	-0.1	-0.22	-0.77**
JRR and NEG	0.52**	0.44*	-0.34
JCR and JDR	0.52**	0.47**	0.22

*Correlation is significant at p-value = 0.05 (2-tailed test).
**Correlation is significant at p-value = 0.01 (2-tailed test).

Table VIII-2: Correlations between Job Flows for the U.S. over Connecticut's Post Cold War Employment Cycle and its Phases			
Correlation Between Rates of:	Post Cold War Cycle (N = 44)	Expansion (N = 32)	Recession (N = 12)
JCR and NEG	0.84**	0.66**	0.38
JDR and NEG	-0.52**	-0.72**	-0.75**
JRR and NEG	0.44**	-0.07*	-0.35
JCR and JDR	0.03	0.05	0.33
*Correlation is significant at p-value = 0.05 (2-tailed test). **Correlation is significant at p-value= 0.01 (2-tailed test).			

Since U.S. job flow data are not available before 1992, we could not base the U.S. correlations on the U.S. employment or business cycles since the beginning periods for both cycles lie outside the range of data. Therefore, we calculated the U.S. correlations for the cycle and phases as defined by Connecticut's Post Cold War Cycle. Despite this limitation, the data do permit us to compare Connecticut and the U.S. over exactly the same period with exactly the same partitions.

Davis et al. (1996)[21] found that, for U.S. manufacturing over the 1972:Q2 to 1988:Q4 period, the correlation between the JCR and NEG was positive and moderately strong (r = 0.69). This result indicates that job creation is procyclical. The results in Tables VIII-1 and VIII-2 indicate that job creation in the Connecticut and U.S. private sectors over the 1992:Q4 to 2003:Q3 period is strongly procyclical. Both correlations are highly statistically significant. Thus, we confirm Davis et al.'s (1996) results. Over the expansion phase of the cycle, the JCR and NEG exhibit positive correlation. The correlation is not quite as strong as it is over the entire cycle, but it is still highly statistically significant. This is the case for both Connecticut and the U.S. For Connecticut and the U.S., the JCR and NEG exhibit positive correlation over the recession phase of the cycle. However, neither correlation is statistically significant.

Davis et al. (1996) found that the JDR was strongly countercyclical. That is, there is a strong, negative correlation between the JDR and NEG (r = -0.92). We do not find such a strong, negative correlation. We also find indications of structural differences between the Connecticut and U.S. economies. For both Connecticut and the U.S., we find a negative correlation between the JDR and NEG, which indicates countercyclical behavior. However, over the entire Post Cold War Employment Cycle, the correlation between the JDR and NEG for Connecticut is very low and not statistically significant (r = -0.10). For the U.S., the correlation was moderately negative, and highly statistically significant (r = -0.52). For the expansion phase of the cycle, the correlation between Connecticut's JDR and NEG is negative, but weak. It is not statistically significant (r = -0.22). The correlation for the U.S. over the expansion phase is strongly negative and highly statistically significant (r = -0.77). During the recession phase, the Connecticut and U.S. correlation between the JDR and NEG exhibits strong, negative, and high statistical significant (r = -0.77 for Connecticut and r = -0.75 for the U.S.).

[21] We base this discussion on the results reported in Davis et al. (1996), Table 2.5, and pp 33.

Davis et al. (1996) found a negative correlation between the JRR and NEG (r = -0.58). This implies that large net employment contractions coincide with high rates of job reallocation. In this study, the results for Connecticut and the U.S. suggest the opposite relationship. That is, over Connecticut's Post Cold War Employment Cycle the JRR and NEG are moderately positively correlated for both Connecticut (r = 0.52) and the U.S. (r = 0.44). Both correlations are highly statistically significant. Thus, for the Connecticut and U.S. private sectors, net employment expansions coincide with high rates of job reallocation, while net employment contractions coincide with low rates of job reallocation. This would fit with results reported in the previous section that suggest that the economy's dynamism rises and falls with the expansions and contractions of economic activity.

The behavior of the JRR and NEG in the Connecticut and U.S. economies over the expansion phase of the employment cycle may offer more evidence on the structural differences between the two economies. There is a positive relationship between the JRR and NEG for Connecticut over the expansion phase of the cycle (r = 0.44), and it is statistically significant. In contrast, the correlation between the JRR and NEG for the U.S. was close to zero and statistically significant (r = -0.07). This implies that there was virtually no relationship between the rate of job reallocation and net employment growth over this period. Thus, for Connecticut, large net employment gains coincided with higher rates of job reallocation. However, there was only a small relationship between net employment gains and the rate of job reallocation for the U.S. Over Connecticut's recession phase, the relationship between the JRR and NEG, for both Connecticut (r = -0.34) and the U.S. (r = -0.35), is virtually the same. In other words, large net employment contractions coincided with higher rates of job reallocation over Connecticut's recession phase. However, over the recession phase, neither correlation is statistically significant.

To summarize the findings on the relationship between the JRR and NEG, it appears that though the correlations for the Connecticut and U.S. economies were virtually identical over the complete cycle and the recession phase, there was a significant difference in their correlations over the recovery/expansion phase of cycle. While high rates of job reallocation coincided with large net employment gains for Connecticut, there was a small, negative relationship between large net employment gains in the U.S. and the rate of job reallocation. Clearly, the U.S. and Connecticut economies behaved differently over this period.

The relationship between the JCR and JDR raises some interesting questions. Davis et al. (1996) found a moderate, negative correlation between the JCR and the JDR (r = -0.36). Over the entire cycle, our results for Connecticut show that there was a moderately positive and highly statistically significant relationship between the JCR and JDR (r = 0.52). On the other hand, there was virtually no relationship between the JCR and the JDR for the U.S. (r = 0.03). Over the recovery/expansion phase, the relationship between the JCR and JDR was positive and highly statistically significant (r = 0.47) for Connecticut. Again, there was virtually no relationship between the two in the U.S. economy over the recovery/expansion phase. However, the behavior of the JCR and the JDR was very similar for both Connecticut (r = 0.22) and the U.S. (r = 0.33) over the recession phase. Both correlations were positive and not statistically significant.

C. Connecticut's Job Flows over the Post Cold War Cycle and Prevailing Views on Business Cycles: The Evidence

Davis et al. (1996) found that the cyclical behavior of manufacturing job flows did not conform well to the predictions of the prevailing view of business cycles. The results showed that job reallocation was countercyclical for the manufacturing sector, which contradicts the predictions of the prevailing view. Hauzenberger (2005) extended Davis et al.'s (1996) data to 1993:Q4 and obtained similar results. We mentioned how our results qualitatively support those of Hauzenberger (2005) and Davis et al. (1996), for our results also refute the prevailing view. However, the majority of our results are quantitatively different from Davis et al. (1996) and Hauzenberger (2005).

In the previous section, we presented our evidence on the relationship between the JRR and NEG. All of this evidence opposes the prevailing view on business cycles. To further explore any discrepancies between the predictions of the prevailing view and the observed behavior of job flows, the remainder of this discussion addresses each one of the four major predictions about job flow behavior as suggested by the prevailing view. We present the results for evaluating the four predictions in Table VIII-3.

Table VIII-3, below, compares the prevailing view's predictions of job flow relationships to the results obtained by Davis et al. (1996),[22] Hauzenberger (2005),[23] and our study.

Table VIII-3: Gross Job Flow Dynamics: Predictions vs. the Evidence

				Our Study***	
Property	Prediction	Hauzenberger*	Davis et al. (1996)**	U.S.	CT.
r (JCR, JDR)	-1.00	-0.33	-0.36	0.03	0.52
Cyclical Change Ratio, JDR:JCR	-1.00	---	-3.68	-0.09	0.34
Variance Ratio JDR:JCR	1.00	3.42	3.35	0.39	0.37
r (JRR, NEG)	0	-0.57	-0.57	0.44	0.52

*Hauzenberger's data covers U.S. manufacturing over the 1972:Q2 to 1993:Q4 period.

**Davis, et al's data covers U.S. manufacturing over the 1972:Q2 to 1988:Q4 period.

***Our Study data covers CT. and U.S. private sectors over the 1992:Q4 to 2003:Q3 period.

--- Hauzenberger did not calculate the cyclical change ratio.

If the first prediction of the prevailing view is correct, then the correlation between the JCR and the JDR should be -1.00. In contradiction to this, Davis et al. (1996) and Hauzenberger (2005) obtained a correlation of -0.36 and -0.33, respectively. In terms of our study, not only was neither of the correlations close to one, but also the results revealed that the relationship between the JCR and the JDR had the *opposite* sign of that predicted. The positive correlation of 0.52 for Connecticut is strongly statistically significant (see Table VIII-1 and VIII-3). There was virtually no relationship for the U.S. One can visually see this result in Figure VII-2, which showed Connecticut's job creation and destruction rates tracking each other very closely over the

[22] The values in the columns labeled 'Prediction' and 'Davis et al' are from Davis et al. (1996), Table 5.1, and pp. 92.

[23] The values in the column labeled 'Hauzenberger' are from Hauzenberger (2005), Table 2, and pp. 8.

complete employment cycle. The correlation quantifies the observed phenomenon in Figure VII-2. Though our results are certainly different from those obtained by Davis et al. (1996) and Hauzenberger (2005), our results contradict the prediction.

The second prediction states the changes in job creation and job destruction move in opposite directions but in equal magnitudes over the cycle. In order to investigate this, we follow Davis et al. (1996) and construct the *cyclical change ratio (CCR)*. The cyclical change is the difference between the average job creation or destruction rate during recessions and the average rate during expansions.[24] The CCR is the ratio of the cyclical change of job destruction to the cyclical change of job creation. The prevailing view predicts a CCR close to -1.00. Davis et al. (1996) obtained a CCR of -3.68. This indicates that job destruction, during recessions, rises by 3.7 times as much as job creation declines. Once again, the results of this study also refute the prevailing view on this property. However, they are different from those of Davis et al. (1996). When Connecticut's economy went from recovery/expansion to recession over the most recent cycle, both the rate of job creation and the rate of job destruction fell. This is consistent with previous results reported in this paper. When moving from recovery/expansion to recession, Connecticut's average JCR fell from 7.12 to 5.99, which is a decline of 1.12 percentage points. The average JDR also fell from 6.76 to 6.38, which is a decline of 0.38 percentage points. Even though the average JCR fell by more than the average JDR, they nevertheless, moved in the same direction. Not only was the correlation, therefore, positive, but also the CCR was positive and significantly less than one (0.34). This indicates that even though the JDR and JCR fall together during recession, the JDR falls only one-third as much as the JCR. This produces the net result of contracting employment. Our result also contradicts the results obtained by Davis et al. (1996). Their results showed that the movement in the JCR and JDR was in opposite directions, as the prevailing view predicted. However, the magnitude of the ratio was nearly four times the prediction. The results for Connecticut, as noted above, showed that job creation and destruction moved in tandem and the CCR was positive, only one-third the size of the prediction, and only one-tenth the size of the ratio obtained by Davis et al. (1996). The U.S. CCR is negative and very close to zero. However, the results could be different for the U.S. had data for the complete U.S. business cycle, employment cycle, or both been available.

The third prediction of the prevailing view is that the variability of creation and destruction rates over time is similar in magnitude. If this result were to hold, then the ratio of the JDR variance to the JCR variance should be 1.00. In fact, Davis et al. (1996) obtained a ratio of 3.4, and Hauzenberger obtained a ration of 3.42. Our results show that Connecticut's ratio is 0.39, and the U.S. ratio is 0.37. Once again, the results for our study not only refute the prediction of the prevailing view, but also they are different from the results obtained by Davis et al. (1996). The results obtained by Davis et al. (1996) and Hauzenberger (2005) indicate that the variability of job destruction is much greater than that predicted by the prevailing view. However, the results of our study show that the job creation rate is more variable than the job destruction rate. Further, these results reinforce the fact that, for the more broadly based private sector of the Connecticut and U.S. economies, changes in job creation appear to play the dominant role in determining the change in net employment growth.

[24] See Davis et al. (1996).

The final prediction of the prevailing view is that the correlation between the JRR and the NEG is close to zero. The results obtained by Davis et al. (1996) and Hauzenberger (2005), once again, contradicted the prevailing view. Instead of no relationship between the JRR and NEG, both studies obtained a correlation of -0.57, which reflected large increases in job reallocation during recessionary periods from 1972 to 1988 and 1972 to 1993, and also in periods when manufacturing employment declined but were not recognized as official recessions (i.e. declines in the manufacturing employment cycle). Our study reports a correlation between the JRR and NEG of 0.44 for the U.S. and 0.52 for Connecticut. These results indicate that job reallocation is procyclical, not countercyclical. That is, the JRR rose for both the U.S. and Connecticut during Connecticut's recovery/expansion period and fell during the recession. This is consistent with the fact that a loss of dynamism seemed to characterize both economies as they went into recession. Once again, our results qualitatively support, but quantitatively refute Davis et al. (1996) and Hauzenberger (2005).

Davis et al. (1996) and Hauzenberger (2005) found the notion that most, if not all, firms respond similarly to the business cycle was not supported by the evidence they found on job flows in manufacturing. The results of our study also do not support the prevailing views on firms' response to the cycle. However, our results also differed from Davis et al. (1996) and Hauzenberger (2005). The two biggest explanations for the disagreement between Davis et al. (1996), Hauzenberger (2005), and the results of our study are the different periods studied and the scope of data coverage. Recall, Davis et al. (1996) and Hauzenberger (2005) examined the U.S. manufacturing sector over the period 1972:Q2 to 1988:Q4 and 1972 to 1993, respectively. Our study used employment for the entire private sector of the U.S. and Connecticut economies over the 1992:Q3 to 2004:Q1 period.

The differences between manufacturing and private sector job flow behavior should not be surprising. Economies of scale are more extensively realized in the manufacturing sector compared to the non-manufacturing sector. This is especially the case for the service sector. The results are that manufacturing processes are more likely than non-manufacturing processes to realize productivity gains (at least, those that are more amenable to measurement). However, this realization has changed from the 1990's onward. The key to Wal-Mart's (and other super stores') success has been introducing economies of scale to the retail industry. Particularly, large square-footage per store and a reduced number of employees per square foot drove the realization of these economies. These developments affected the U.S. economy after the periods analyzed by Davis et al. (1996) and Hauzenberger (2005).

The various periods analyzed in the three studies also play an important role in the differences in the results. After employment peaked at 21 million in 1979, U.S. manufacturing employment declined going into the 1981-82 recession. It rose briefly coming out of the recession, but then began declining again after 1983 due to the rising value of the dollar. After the signing of the Plaza Accord on September 22, 1985, manufacturing employment grew again until 1989, just before the 1990-91 recession.[25] Manufacturing employment's medium-to-long-run trend has been a progressive decline since the late 1970's. Throughout this period, import competing industries within the manufacturing sector were subject to higher rates of job displacement; but

[25] See Kletzer (2002), p.p. 47-48

beyond this sector, the relationship between rising import share and high rates of job loss was considerably weaker.[26]

Thus, historically, import penetration more directly affected manufacturing. Exchange rates and other international economic conditions have traditionally affected the ability of manufacturing firms to export more quickly and to a greater degree when compared to other sectors of the economy.[27] All of this is especially true for the periods analyzed by Davis et al. (1996) and Hauzenberger (2005).[28] This is not as true for the period covered by our study. The combination of these, and other, factors would produce differences in the behavior of job reallocation over the employment cycles of the manufacturing and non-manufacturing sectors.

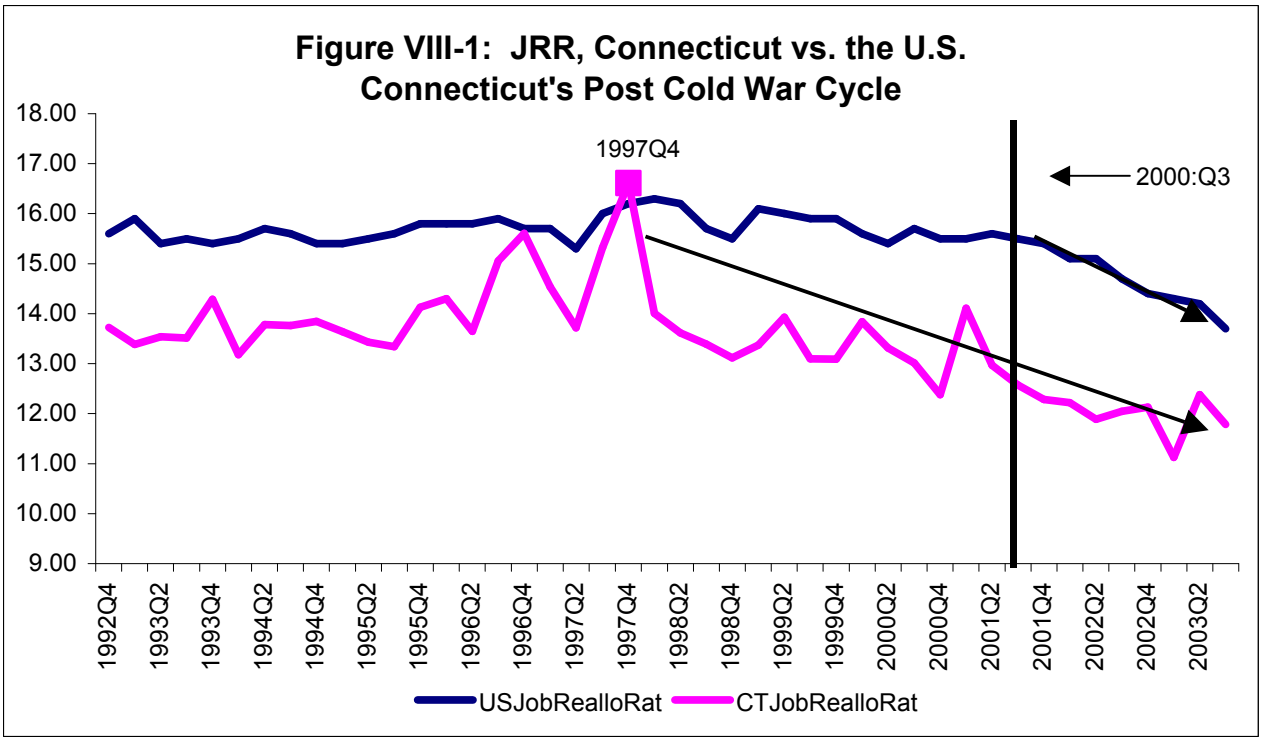
The "New Economy" characterized a significant segment of the period analyzed in our study. This could imply that a decline in the price of information technology (IT) combined with an increase in the pace of IT diffusion to more sectors of the economy, resulted in successive quantum plunges in the costs of computing power.[29, 30] This process of technological change, in conjunction with an acceleration in IT diffusion, would present firms with a new learning curve as they seek to find the new optimal input combination of capital and labor to produce some given level of output. Further, as the late-1990's bubble approached critical mass, the fever pitch of firms engaging in successive rounds of new IT equipment purchases in order to stay one step ahead of the competition produced a sort of "IT arms race." These dynamics might explain our findings that job reallocation intensified as the recovery/expansion phase of the 1990's cycle progressed. With the collapse of fixed investment (especially in the telecommunications and related sectors), the stock market, and Dot.com bubbles in 2000,[31] this ever-intensifying set of dynamics came to a screeching halt. These factors not only caused a collapse in the demand for routers and other IT equipment, but also the liquidation of the failed Dot.com firms flooded the market with recently purchased, second-hand IT equipment. In addition, at the end of the IT Arms Race, many firms began to concentrate on how to best use the IT equipment they already had rather than frantically purchase new equipment. The result was that many firms began, for the first time, to slide down the learning curve on their new equipment. Consequently, many firms found that they had more IT equipment and labor than necessary to meet their current, reduced demand (i.e. excess capacity).

The confluence of these factors resulted in the first fixed investment led recession in the Post World War II Era. In the face of a collapse in the demand for labor, equipment, and software,

[26] Ibid, p.144
[27] Of course, since the 1990's and the rise of Wal-Mart (and other super stores) and its significant purchases from China and other foreign sources, import competition not only affects manufacturing, but also the retail sector. The service sectors also feel the impact because functions in that area are being outsourced to India and other countries.
[28] In fact, in the last year covered by Hauzenberger's study, 1993, the U.S. was in the midst of the 'jobless recovery.'
[29] That is, there were successive increases in the number of transistors that could fit on a microchip, increasing the computing power of a given chip. Thus, if the cost of a chip remains constant, and the number of transistors that fit on the chip increases, then the price per transistor must fall. Thus, the cost of computing power declines.
[30] There is controversy over the idea of a "New Economy." On the one hand, Oliner and Sichel (2000) contend that the productivity growth of the 1990's was merely due to increases in factor utilization. On the other hand, Basu, Fernald, and Shapiro (2001) argue that though increased utilization drove productivity gains at the beginning of the 1990's, the rate of technological change drove productivity growth by the end of the decade.
[31] In addition, the decline in demand for programmers and others after Y2K and, of course, the 9/11 Attacks also played critical roles.

firms frantically began to cut costs. As the economy moved into recession, our study's observed decline in job reallocation is consistent with the sudden standstill in economic activity after 2000. This new set of dynamics could explain why Davis et al. (1996) found that job reallocation was countercyclical from 1972:Q2 to 1988:Q4, and Hauzenberger (2005) found that it was countercyclical from 1972:Q2 to 1993:Q4. Again, keep in mind that Davis et al. (1996) and Hauzenberger (2005) were confined to the U.S. manufacturing sector, whereas we based our study on data covering the entire U.S. and Connecticut private sectors.

What is apparent from our results is that there are significant structural differences between the U.S. and Connecticut economies. This, of course, was clear from the discussions in previous sections. Connecticut did not participate in the boom-bubble-bust process over the 1990's to the same extent as other regions of the country. Places such as Boston and Silicon Valley felt the full effects of the boom-bust roller coaster ride due to a stronger presence of semiconductor manufacturers. On the other hand, Connecticut's economy experienced neither the level of boom nor the level of bust experienced by those states, regions, and metro areas whose economies had stronger ties to the fate of the "New Economy." The differences in job flow dynamics observed for Connecticut and the U.S. over our study's period of analysis reveals the differences between the Connecticut and U.S. economies. Figure VIII-1, below, plots the JRR for Connecticut and the U.S. over Connecticut's employment cycle.



Note that job reallocation in the U.S. economy is everywhere higher than that for Connecticut's economy. The infamous spike in the fourth quarter of 1997 encountered throughout this study is the only period in which Connecticut's JRR exceeded that for the U.S. The average JRR for the U.S. over the period is 15.5 compared to 13.5 for Connecticut. Further, the variance in

Connecticut's JRR is 3.8 times the size of the variance for the U.S. JRR. Thus, job flows are much more volatile in Connecticut's labor market than they are in the U.S. labor market.

Other differences in job flows in the Connecticut and U.S. economies are also apparent. After the vertical line that represents the third quarter of 2000 (see Figure VIII-1), the rate of U.S. job reallocation activity begins falling rather quickly as emphasized by the black arrow superimposed on the U.S.[32] It is 2000:Q3 (specifically, July) when U.S. industrial production and capacity utilization fell. It is also the period when Connecticut's nonfarm employment turned down, ushering in the recession phase of Connecticut's employment cycle. However, note that job reallocation activity in Connecticut's economy began falling rather quickly after 1997:Q4, the period of the spike (as indicated by the black arrow superposed on Connecticut's JRR). Further, though slightly upward from 1992:Q4 to 1997:Q4 and downward from 1997:Q4 to 2000:Q3, the trend in the JRR for the U.S. did not significantly decline until after 2000:Q3, which is when the bubble burst (as recounted above). Before 1997:Q4, the trend in job reallocation activity for Connecticut was slightly upward. In fact, the positive slope in Connecticut's JRR was steeper than that for the U.S. However, the decline in job reallocation activity in Connecticut from 1997:Q4 onward was much steeper than its growth until 1997:Q4. Further, the steep decline in Connecticut's JRR began 11 quarters (nearly three years) before the steep decline in the U.S. JRR.

The difference in the number of jobs created per 1,000 jobs destroyed summarizes this point. Over the period defined as Connecticut's Post Cold War Cycle, on average, the U.S. economy created 1,051 jobs for every 1,000 jobs destroyed. The Connecticut economy created 1,023 jobs for every 1,000 jobs destroyed. The difference of 28 jobs is what separates the U.S. and Connecticut economies' net job creation performance.

D. Some Theoretical Aspects and Implications for the Findings on Business Cycle Theory

1. Introduction

The evidence we presented, above, raises as many questions as it answers. Should researchers modify or throw out the prevailing view? Is there an alternative view that is consistent with the evidence? Over the last decade or so, there has been an explosion of research on job creation and destruction and the implications for explanations of business cycle behavior. Davis et al. (1996),[33] survey some explanations that offer an alternative to the prevailing view. This alternative is consistent with the job flow evidence we discussed. Two important factors play a role in the alternative view, and these factors offer a more satisfactory explanation of the evidence on labor market dynamics. These factors are heterogeneity and reallocation frictions.

A common thread in these factors is that they start from the premise that the economy is subject to a continuous stream of allocative shocks. These shocks cause idiosyncratic variation in the profitability among establishments and worker-job matches. This, in turn, is predicated on

[32] We recognize that the U.S. JRR begins a very slight decline starting approximately in 1998. Here, we refer to the steep decline in the U.S. JRR, which began in 2000:Q3.
[33] See Chapter 5, pp. 104-112.

heterogeneities among workers and establishments. In addition, there is an emphasis on search costs, moving costs, sunk investments, and other frictions that impede the free allocation of factor inputs. The combination of frictions and heterogeneity produces an important role for allocative shocks and the reallocative process in aggregate economic fluctuations.

2. Two Theories: Allocative vs. Aggregative Forces

Following Hauzenberger (2005), two types of theories have arisen to explain the cyclical properties of job creation and destruction. The first type is allocative theories. These are predicated on the notion that job reallocation causes business cycles. Within this framework, job reallocation acts as an impulse. The second type reverses the causation. In aggregative theories, business cycles cause reallocation. In this family of theories, job reallocation is a propagation mechanism, amplification mechanism, or both. Table VIII-4, below, summarizes the features of both types of theories.

Table VIII-4: Two Families of Theories of Job Reallocation and the Business Cycle

Theory Type	Mechanism	Driving Forces
Aggregative	Economic factors initially affect firms or consumers in a similar direction and magnitude.	· Aggregate Demand –Income –Output –Employment
		· Aggregate Productivity
Allocative	Economic factors initially affect firms or consumers in a dissimilar direction or magnitude.	· Sectoral Demand
		· Sectoral Productivity
		· Relative Prices

Source: Hauzenberger (June 2005)

Theories based on allocative driving forces model workers, plants, capital, products, and other markets and sectors as being heterogeneous. Within this framework, multi-sector models represent the changes in relative prices, relative productivity, and consumers' tastes and preferences as the mechanisms that induce the reallocation of resources across plants and sectors. In addition, since costly and time consuming frictions prevent the instantaneous reallocation of factors, economic agents must expend time and resources to reassign resources to their new, most highly valued use. Such frictions involve forgone output and reductions in aggregate economic activity (see Davis and Haltiwanger, 1990).

Theories based on aggregative forces model shocks as originating outside the modeling framework. The focus is then on how this mechanism (the external shock) drives factor reallocation in response to the external disturbance. Three basic classes of models have emerged. The first class is models that develop direct links between aggregate shocks and factor reallocation. Specifically, these models link job creation and destruction through the job search process (Mortenson, 1994), reduced profitability of low-productivity firms (Caballero and Hammour, 1994), and inefficiencies due to incomplete contracting, financial market imperfections, and sub-optimal government policies (Caballero and Hammour, 1996). The second class is models that use the reallocation timing hypothesis (RTH) to develop an indirect

link between aggregate activity and factor reallocation (see Davis and Haltiwanger, 1990). The RTH states that it is optimal to bunch factor reallocation activity into periods of low opportunity cost, which is during a recession when aggregate demand, and therefore, lost output, is low. This inter-temporal substitution generates countercyclical reallocation. The third class is models that assume the presence of microeconomic non-convexities.[34] Aggregate shocks represent small shifts in the average employment gaps but generate large employment changes by pushing some plants over the adjustment threshold (see Caballero, Engel, and Haltiwanger, 1997).

Because of ambiguities, the debate over whether allocative or aggregative forces act as the drivers of business cycles continues. There are three major sources of ambiguities:

1. Changes in aggregate driving forces often effect sectors differently,
2. Changes in aggregate demand typically are not spread evenly throughout the economy, and
3. Allocative forces, such as relative prices, appear to have aggregate implications as well.

Empirical studies assign a role for both theories depending on the frequency of the data used in the analysis (Hauzenberger, 2005 p.17). Medium to low frequency macroeconomic data appears to confirm aggregative factors as the drivers of cycles. Higher frequency data, such as daily or hourly, points toward allocative forces as the initiators of fluctuations. However, the two types of theories have problems other than ambiguities. As Hauzenberger (2005, p. 19) notes, both classes of models suffer from another significant shortcoming. Neither the allocative nor the aggregative class of models offers any guidance on the causes of business cycles beyond simply stating that either relative changes or exogenous shocks, respectively, cause cycles. Both types of models take business cycles as given.[35]

With the above survey of current theories and their shortcomings, the last part of this section discusses the results of our study, and how they fit within the framework of recent progress in developing theories explaining the connection between job creation, job destruction, and aggregate fluctuations.

3. Connecticut Job Flows and Current Alternatives to the Prevailing View

Consistent with the results obtained by Davis et al. (1996) and Hauzenberger (2005), our study has found that job creation and destruction did not behave according to the predictions of the prevailing view of the cycle. Nevertheless, there were also some important differences in the results from our study and those obtained by Davis et al. (1996) and Hauzenberger (2005). We summarize some specific differences within the context of the four predictions of the prevailing view in Table VIII-5, below. The entries in the first column are the four predictions of the prevailing view. The second, third, and fourth columns contain the findings of Davis et al. (1996) and Hauzenberger (2005) (second column), and our study (third and fourth columns).

[34] Non-convexities imply that there is not a one-to-one relationship between an increase in costs and a reduction in staff by a firm. In other words, increases and decreases in workers are 'lumpy' not smooth (see Hamermesh, 1993 Ch. 7)

[35] See Appendix B for more information.

Table VIII-5: Differences in Findings between the Our Study and Davis et al. (1996) and Hauzenberger (2005)			
Prevailing View	Davis et al. and Hauzenberger	Our Study	
		CT	US
Job Creation and Destruction move in opposite directions over the business cycle	Job Creation and Destruction do not always move in the same direction over the business cycle.	Job Creation and Destruction *generally* move in the same direction over the business cycle.	There is *no* relationship between the movements of Job Creation and Destruction over the business cycle.
Job Creation and Job Destruction are of similar magnitude but move in opposite directions over the business cycle	Job Creation and Job Destruction *are not similar* in magnitude, but they *do* move in opposite directions over the business cycle. *	Job Creation and Job Destruction *are not* of similar magnitude, and they move in *the same direction* over the business cycle.	There is *no* relationship between the magnitude and direction of change in Job Creation and Job Destruction over the business cycle.
The variability of the Job Creation and Job Destruction rates over time is similar in magnitude	Job Destruction is more variable than Job Creation over the cycle. However, during expansions the variances of creation and destruction are more similar.	*Job Creation* is more variable than Job Destruction over the business cycle. Variation in Job Creation is 2.3 times that of Job Destruction in expansion, but the variation in Job Destruction is only 1.5 times that of Job Creation in recession.	Job Destruction is more variable than Job Creation over the business cycle. Moreover, variation in Job Destruction is 1.6 times that of Job Creation in recession, but variation in Job Destruction is 1.2 times that of Job Creation in *expansion.*
There is no relationship between the rate of job reallocation and Net Employment Growth over the business cycle. That is, it is acyclical.	The relationship between Job reallocation and Net Employment Growth is countercyclical. It increases during recessions and declines over long expansions.	The relationship between job reallocation and Net Employment Growth over the business cycle is positive. That is: it is *procyclical.*	The relationship between job reallocation and Net Employment Growth over the business cycle is positive. That is: it is *procyclical.*

* Hauzenberger did not calculate the CCR

Focusing on Connecticut, we can argue that both types of the theories summarized in Table VIII-4 can explain some, but not all, of the job flow dynamics observed over the Post Cold War Cycle. From the trough of the 'Great Recession' (1992:Q4) until the mid 1990's, the mechanisms operating on the State's economic dynamics were probably allocative factors. The specific driving forces were changes in sectoral demand and changes in sectoral productivity. The end of the Cold War was a worldwide event that had a significant impact on the global economy by opening up markets and increasing the potential supply of goods and services available in the world's markets. Potentially, the end of the Cold War increased the demand for the planet's goods, services, and resources. However, there were losers, too. Particularly affected were those industries that provided the weapons, equipment, supplies, logistics, infrastructure, and other goods and services that supported the defense needs of the Superpower standoff. Further, there were differential effects on the U.S. defense industry depending on given sectoral specializations and geographic location.

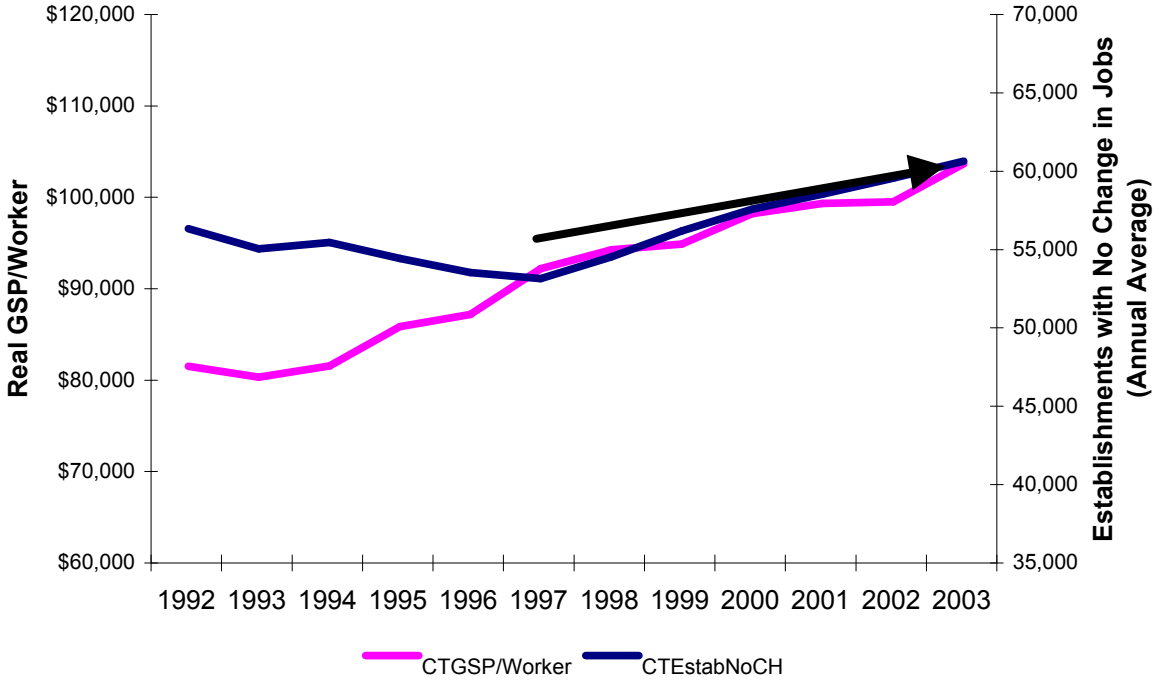
With the end of the Cold War, demand for the products produced by Connecticut's defense-oriented manufacturing firms suddenly shrank. Further, Connecticut's defense-oriented industries were concentrated in those sectors that were most effected by the cutbacks in military spending following the collapse of the Soviet Union. In addition, the bursting of the real estate bubble brought about an immediate drop in the demand for the goods and services produced and provided by the construction, real estate, wood and home-related manufacturing, and architectural and engineering firms. Demand also dropped for the goods and services produced by wholesale and retail firms related to construction and home furnishings. Banking and insurance firms belonged to industries that also felt this sectoral demand shock. Changes in sectoral productivity also played an important role as Hartford's insurance industry went through a massive restructuring. Since job creation and job destruction tracked each other very closely over this period, jobs were being created. Unfortunately, job creation was not occurring at a rate sufficient to stave off the 'jobless recovery' that entrenched itself after the carnage of the 1989:Q1-1992:Q4 recession and restructuring.

The jobless recovery was not unique to Connecticut. The national economy was also experiencing a recovery plagued by no net job creation. The U.S. economy apparently had different mechanisms producing the same kinds of jobless recoveries coming out of both the 1990-1991 and 2001 recessions. Faberman (2004) found that the 1990's jobless recovery was the result of a job destruction rate that did not recede to its pre-recession level; following the 2001 recession, the job creation rate never recovered to pre-recession levels despite the decline in the job destruction rate. These set of dynamics caused the most recent jobless recovery.

The forces affecting the national economy were most likely different from those affecting Connecticut's economy. One can more fully appreciate the differences between the Connecticut and U.S. jobless recoveries by referring back to Figures VII-2 and VII-5. After 1993:Q2, the U.S. job destruction rate falls below the U.S. job creation rate. However, the Connecticut job creation and destruction rates continue to track each other fairly closely until the spike in Connecticut's job creation rate in the fourth quarter of 1996. Again, this probably reflects the more significant impacts of the changes in sectoral demand affecting Connecticut that we just discussed. It is apparent from Figures VII-2 and VII-5 that different sets of dynamics were operating on the Connecticut and U.S. economies over this period.

There were other allocative factors at work as well, and they tended to be significant mechanisms toward the last half of the 1990's. Particularly, sectoral changes in relative prices and productivity appeared to be the principal allocative mechanisms operating on Connecticut's economy toward the end of the last decade of the 20th Century. As discussed above, computing prices were dropping, which resulted in a decline in the cost of personal computers and the price of capital, relative to labor, for businesses. This may explain the significant and steady rise in the number of establishments in Connecticut with no net change in employment from 1997 onward,[36] which is when Connecticut's job reallocation began rapidly decelerating (see Figure VIII-1). In fact, we see that real gross state product per wage and salary (Real GSP/WS) worker begins to track the rising number of establishments with no net employment change. Figure VIII-2 shows this relationship quite clearly.

Figure VIII-2: CT GSP/WS Worker vs. Number of Establishments with No Change in Jobs (Private Sector): CT Post Cold War Cycle



However, there is no such pattern for the U.S. JRR over this period. Given that the "New Economy" seemed to be a more significant driver of economic activity in the U.S. over this period than it was in Connecticut, it seems unlikely that this could serve as the only explanation. Another possible explanation is that the observed job flow behavior could also reflect increases in sectoral productivity for Connecticut's firms relative to the U.S. That is, in addition to industry-mix, geographic-specific firm heterogeneity within a given industry or sector could play an important role. However, the evidence for such an argument is mixed. Though Connecticut's

[36] Although, outsourcing, in particular, domestic outsourcing, could account for a portion of it. Overseas outsourcing seems to play a more important role after the bubble burst in 2000.

real private sector gross state product (GSP) per private sector wage and salary worker is higher than that for the U.S., suggesting a higher level of productivity for Connecticut, productivity growth appears to have been faster in the U.S. economy over this period. Between 1992 and 2003, U.S. GSP/worker grew 58.6 percent, while Connecticut's GSP/worker grew by 35.5 percent.[37] In other words, in 2003, Connecticut needed 9.73 private sector wage and salary workers to produce $1 million of GSP while the U.S. needed 12.37 workers. Further, while, between 1992 and 2003, Connecticut reduced the number of workers needed to produce $1 million of GSP by 26.2 percent, the U.S. reduced the number of workers needed to produce $1 million of GSP by 23.3 percent. What is likely occurring here is that Connecticut's productivity, though growing, is growing more slowly than that of the U.S. That is, Connecticut's productivity edge over the U.S. economy is slipping.

Finally, aggregative mechanisms may have been at work, particularly with regard to the growth in aggregate productivity[38] in the last half of the 1990's, the positive spillover effects on Connecticut from the growth in national aggregate demand during the boom/bubble, and the negative spillover effects after the bursting of the bubble after 2000. The 'top-down' affects from the national to the State's economy can be appreciated by looking at the correlations between selected job flows in the U.S. and Connecticut economies presented in Table VIII-6, below. As an arbitrary cut off, correlations with an absolute value above 0.60 are boldfaced. The U.S. JCR exhibited positive correlation with Connecticut's JCR, JRR, and NEG over Connecticut's Post Cold War Employment Cycle. The U.S. JRR and NEG also exhibited positive correlation with Connecticut's JCR, JRR, and NEG. Interestingly, the U.S. JDR had no relationship with any of the Connecticut job flows appearing in Table VIII-6. Thus, the job destruction rates for both Connecticut and the U.S. appear to be following completely independent paths.

Table VIII-6: Correlations Between CT and U.S. Job Flows, CT Post Cold War Cycle

	US JCR	US JDR	US JRR	US NEG
CTJCR	**0.80**	-0.02	**0.67**	**0.69**
CT JDR	0.39	0.28	0.48	0.18
CT JRR	**0.73**	0.11	**0.68**	0.57
CT NEG	**0.66**	-0.22	0.44	**0.67**

The critical point conveyed in Table VIII-6 is that there is evidence that aggregative mechanisms were also at work on Connecticut's economy over the analysis period. That is, the growth in aggregate income, aggregate output, and aggregate employment in the U.S. economy filtered down to the Connecticut economy with a lag and muted impact, especially with regard to employment growth (as discussed below).

[37] U.S. Bureau of Economic Analysis, Regional Economic Information System <http://www.bea.gov/bea/regional/gsp/help/OnlineHelp.htm> August 8, 2006. There is a slight difference between U.S. GDP and GSP. See the reference in this footnote for more information Gross State Product Help.

[38] However, the growth in aggregate productivity probably reflected strong sectoral productivity growth that boosted the productivity numbers for the whole economy as significant productivity gains were confined to specific sectors of the economy in the 1990's.

After the post-2000 downturn in economic activity, aggregative mechanisms probably drove the effects on Connecticut's economy. With the end of demand for programmers and others after Y2K, the collapse of the stock market and investment demand, the bursting of the Dot.com bubble, and the 9/11 attacks, Connecticut's economy was clearly subjected to aggregate shocks, both economic and non-economic, which resulted in significant shocks to aggregate income, output, and employment.[39] In addition, one can find evidence for this argument in the correlations presented in Table VIII-6. Further, with significant overcapacity, especially in the telecommunications industry, firms were now confronted with the need to frantically cut costs. This, in combination with learning-curve effects (discussed above) and outsourcing[40] (especially offshore outsourcing), drove aggregate productivity gains that accelerated as the U.S. economy moved out of the 2001 recession. Again, heterogeneity concerning the productivity of Connecticut firms relative to national firms in the same industry could have produced the differential responses of the Connecticut and U.S. labor markets to the recession and subsequent structural changes that followed. Specifically, based on the discussion above, for every $1 million drop in private sector real GSP, Connecticut's economy would shed 9.73 private sector wage and salary employees for every 12.37 shed by the U.S. economy. Of course, this same set of phenomena would predict that Connecticut's job growth in the recovery/expansion phase of the cycle would be more muted than that for the U.S.

IX. Concluding Remarks

Through utilization of the BED created by the U.S. Bureau of Labor Statistics, the data obtained from the DOL, and drawing on alternative theories to the prevailing view on business cycles, we have been able to draw some tentative inferences about some long term trends in the Connecticut labor market over the 1992:Q3-2004:Q1 period. In addition, we have also discovered some interesting, and sometimes surprising, characteristics about the behavior of job flows over Connecticut's first complete employment cycle since the end of the Cold War.

Over the period ranging from 1992:Q3 to 2004:Q1, there has been an increasing trend in job reallocation until 1997:Q4 and a decreasing trend afterwards. Job reallocation in Connecticut seems to be more heavily influenced by the job creation rather than the job destruction processes. Over this same period, the number of jobs created per job destroyed has not reached its 1992:Q3 level more than a handful of times (in fact, only twice). The trend in the number of jobs created per job destroyed was found to be more heavily influenced by the establishment expansion rate (ER) as opposed to the opening rate (OR); however, the volatility in the OR appears to ten times larger than the volatility in the job creation/destruction ratio (JCDR). In general, the evidence reported in this paper tentatively supports the argument that Connecticut's labor demand conditions are structurally different from those in the U.S. labor market.

The differences between the U.S. and Connecticut job flows over the business cycle reinforces the conclusions drawn from observing the long term trends in the State and national labor

[39] However, the origins of the U.S. downturn were probably sectoral. Much of the over-investment was in the telecommunications sector. Many of the Dot.coms were connected, directly or indirectly, to telecommunications. This is precisely why we argue that both aggregative *and* allocative mechanisms played a role.

[40] Prestowitz, Clyde, *Three Billion New Capitalists* (2005), Basic Books: New York.

markets. That is, there are significant structural differences in the workings of the U.S. and Connecticut labor markets. In contrast to the U.S., Connecticut's JCR and JDR tracked each other rather closely over the Post Cold War Employment Cycle measured trough-to-trough. The lager gap between the JCR and JDR for the U.S. revealed, from a dynamic perspective, the source of the difference between the U.S. and Connecticut NEG. Further, Connecticut's labor market dynamism, as measured by the JRR, lost its intensity after the 1997 spike in activity, which was eleven quarters before the steep decline in the U.S. JRR in the third quarter of 2000. Further, the variation in Connecticut's JRR was much larger than that for the U.S. The tangible results of these differences in labor market dynamics can be seen in the actual number of jobs created per 1,000 jobs destroyed. Over the period defined as Connecticut's Post Cold War Cycle, on average, the U.S. economy created 1,051 jobs for every 1,000 jobs destroyed. The Connecticut economy created 1,023 jobs. The difference of 28 jobs is what separates the U.S. and Connecticut economies' net job creation performance.

Our results qualitatively agree with Davis et al. (1996) and Hauzenberger (2005) because our results offer evidence against the prevailing view on business cycles. However, the results of our study quantitatively disagree with the results obtained by Davis et al. (1996) and Hauzenberger (2005). Particularly, the results of our study indicated that, for Connecticut, job creation and job destruction generally moved in the same direction over the cycle, while there was no relationship between their movements for the U.S. Job creation and destruction were of different magnitudes and moved in the same direction for Connecticut. For Connecticut, job creation was more variable than job destruction over the cycle. The opposite was the case for the U.S. Finally, the relationship between the JRR and NEG was procyclical for both Connecticut and the U.S.

The two biggest explanations for the disagreement between Davis et al. (1996), Hauzenberger (2005), and the results of our study could be based in the different time periods studied and the scope of data coverage. Davis et al. (1996) looked at the U.S. manufacturing sector over period from 1972:Q2 to 1988:Q4. Though Hauzenberger extended the time series used by Davis et al. (1996) to 1993, his extended data still ends one year into our study's period of analysis. Further, Hauzenberger's (2005) study still confines itself to U.S. manufacturing data. Our study obtained employment for the entire private sector for the U.S. and Connecticut from 1992:Q3 to 2004:Q1. The differences between the behavior of job flows in the manufacturing and entire private sectors, in conjunction with the significant differences in the U.S. and Connecticut economies, over the different study periods probably account for a large part of the differences in results.

We argued that aggregative and allocative theories arose out of the job creation and destruction literature to explain some, but not all, of the job flow dynamics observed over Connecticut's Post Cold War Cycle. From the trough of the 'Great Recession' (1992:Q4) until the mid 1990's, the mechanism operating on the State's economic dynamics was probably allocative. The specific driving forces were changes in sectoral demand and changes in sectoral productivity. The end of the Cold War was a worldwide event with a significant impact on the global economy by opening up previously closed markets and increasing the potential supply of goods and services available in the world's markets, as well as potentially increasing the demand for the planet's goods, services, and resources. Nevertheless, there were losers too. Particularly affected were those industries that provided the weapons, equipment, supplies, logistics, infrastructure, and other goods and services that supported the defense needs of the Superpower standoff. With its

heavy concentration in defense-related industries, Connecticut was hit particularly hard by Post Cold War reductions in defense budgets. Changes in sectoral productivity also played an important role as Hartford's insurance industry went through a massive restructuring.

Aggregative mechanisms may have been at work, particularly with regard to the growth in aggregate productivity in the last half of the 1990's, the positive spillover effects on Connecticut from the growth in national aggregate demand during the boom/bubble, and the negative spillover effects after the bursting of the bubble after 2000. Aggregate mechanisms probably drove the downturn in Connecticut's economic activity after 2000. However, allocative mechanisms were at work during this period as well. Heterogeneity with regard to the productivity of Connecticut firms relative to firms nationally in the same industry could have produced the differential responses of the Connecticut and U.S. labor markets to the recession and subsequent structural changes that followed.

Finally, there were three very precarious peaks in job reallocation throughout the long-run period under observation. These peaks occurred during the fourth quarters of 1996 and 1997 and the first quarter of 2001. The peak in 2001 is associated with job destruction more so than job creation, and the recession experienced by the economies during this period explains this peak. The peaks in reallocation during 1996 and 1997 are more difficult to explain, as there is no readily available economic interpretation of the data. However, we have been able to show that these peaks appear to be caused by the jobs being created through opening establishments. Further research is needed in order to more fully explain these phenomena.

As with any research, just as many questions were raised as were answered. The questions raised here suggest a certain set of directions for future research into the dynamics of the State's labor markets. First, and most obvious, what caused the apparent shift in Connecticut's economy after 1997? Answers to this question lay in changing the focus from aggregate job flows to investigating job flows by industry sector. This would not only take a track into labor market dynamics and business cycles, but also produce some important results in the tangential areas of industrial organization and regional economics. More importantly, answering this question could yield critical insights into the processes that drive Connecticut's economic fortunes and reveal what recent currents portend the State's economic future. In addition, such research could indicate what, if any, policies might foster a climate of sustained growth, particularly in terms of reducing frictions, promoting human capital investment, aligning the supply and demand for skill sets, and reducing other impediments to the efficient and equitable functioning of the State's labor markets.

More specifically, lines of research might focus on the study of establishment dynamics, which may not only offer some clues into the possible structural shift in 1997, but also yield insights into how the opening, closing, expansion, and contraction of establishments drive the aggregate job flows. Future studies of establishment behavior in Connecticut might focus on identifying important establishment characteristics such as age, life expectancy, size, industry, persistency, labor market area, and the role these characteristics play in the creation and destruction of jobs. Finally, with the availability of data on both establishment dynamics and worker histories, the opportunity would be available to explore worker flows, job flows, and their interplay based on more complete information than was previously available.

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XI. Appendix A – Selected Equations

	Equation	
Definition	**Establishment**	**State/Nation**
Job Creation (JC)	$E_{it} - E_{it-1}$	$\sum_i (E_{it} - E_{it-1})$
Job Destruction (JD)	$\lvert E_{it} - E_{it-1} \rvert$	$\sum_i (\lvert E_{it} - E_{it-1} \rvert)$
Job Reallocation (JR)	-	$JC_t + JD_t$
Worker Inflow (WI)	H_{it}	$\sum_i H_{it}$
Worker Outflow (WO)	S_{it}	$\sum_i S_{it}$
Worker Flow (WF)	$H_{it} + S_{it}$	$\sum_i H_{it} + \sum_i S_{it}$
Churning Flow (CF)	$WF_{it} - JR_{it}$	$WF_t - JR_t$
Denominator (D)	$(E_{it} + E_{it-1})/2$	$(E_t + E_{t-1})/2$

E_{it} = Employment at establishment i at time period t

H_{it} = Hires at establishment i at time period t

S_{it} = Separations at establishment i at time period t

| * | = Absolute value operator

At the establishment level, job creation and job destruction are equal to job reallocation since at any one time, an establishment can experience either job creation or job destruction, but not both. At the national or state level, job reallocation is equal to the summation of all positive employment changes from all firms experiencing job creation plus the summation of the absolute value of all employment changes from all firms experiencing job destruction. The denominator is utilized when converting these flow measures into rates.

XII. Appendix B – Comparing Business Cycle Theories

Business Cycle Theories with Countercyclical Reallocation

Features	Theories Based on Aggregative Driving Forces	Theories Based on Allocative Driving Forces
Role Played by Driving Forces	Aggregate forces are the principal drivers that generate business cycle fluctuations.	Allocative forces are the principal drivers that generate business cycle fluctuations.
Direction of Causation	Business cycles cause reallocation.	Job reallocation causes business cycles.
Job Reallocation Mechanism[41]	Job reallocation is a *propagation*, or *amplification*, mechanism.	Job reallocation is an *impulse*.
Defining Driving Forces	Driving forces are economic factors that initially affect firms or consumers in a similar direction and magnitude.	Driving forces are economic factors that initially affect firms or consumers in a dissimilar direction or magnitude.
Specific Driving Forces[42]	Aggregate demand, aggregate productivity	Sectoral demand, sectoral productivity, relative prices
Theories	A. Theoretical models based on aggregative driving forces generally take the aggregative force as a shock occurring outside the model, and the focus is on explaining how factor allocation changes in response to the shock. B. Three basic classes of models have emerged: 1. One class of models develops direct links between aggregate shocks and factor reallocation, specifically, job creation and job destruction. 2. A second class of models develops an indirect link between aggregate activity and factor reallocation. 3. A third class of models assumes the presence of microeconomic nonconvexities that produce discrete and infrequent employment adjustment from (S, s) or adjustment hazard-type policy rules.	A. Models with allocative driving forces introduce heterogeneity of workers, capital, plants, products, etc. B. Often, plants are grouped by common characteristics, such as industry, which form the sector. C. The allocation of factors of production across plants and sectors is primarily determined by relative prices of goods and factors, relative productivity, and consumers' tastes and preferences for goods. D. Allocative driving forces cause a change in the desired allocation of factors across plants. E. Multi-sector models, in which allocative forces drive recessions, usually focus on one particular driving force that disrupts the optimality of existing factor allocation.

[41] Hall, Robert. "A Theory of Recessions." Unpublished, 1997.

[42] Keep in mind that demand is measured by income, output, employment, or relative prices, and demand is observable. Productivity, on the other hand, is unobservable and is usually estimated as a *Solow residual*, which is a concept fraught with measurement difficulties.

Business Cycle Theories with Countercyclical Reallocation (Continued)

Features	Theories Based on Aggregative Driving Forces	Theories Based on Allocative Driving Forces
Theories (Continued)		F. In all these models, the driving forces induce desired reallocation across plants and sectors. Actual reallocation ultimately depends on the magnitude, timing, permanence, and uncertainty associated with the driving forces. G. In a world without frictions, factor reallocation would occur instantly. However, reality is full of time-consuming frictions that prevent factors from being instantly reassigned to the plant where they are most highly valued. Plants that become unprofitable due to allocative shocks may destroy jobs quickly, but the job creation process often takes more time. H. Construction of new structures, along with the delivery and installation of new equipment, may involve significant lead times. Moreover, matching displaced workers to newly created job openings often requires workers and firms to acquire new information, retrain, or shift geographic location. All of these types of frictions typically involve forgone output and a reduction in aggregate activity.

Source: Schuh, Scott and Robert K. Triest, *Job Reallocation and the Business Cycle: New Facts for an Old Debate* in Beyond Shocks: What Causes Business Cycles? Eds. Jeffrey C. Fuhrer and Scott Schuh, Federal Reserve Bank of Boston: Boston (June 1998)