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# Net Job Creation in the U.S. Economy: Lessons from Monthly Data, 1950-2011

May 25, 2012

*Preliminary and Incomplete*

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## ***Abstract***

In this paper, I study the monthly net job creation (NJC) at the aggregate level in the U.S. over the period 1950-2011. The paper has few important findings. First, NJC did not show a significant trend over the last 6 decades, which resulted in a fall in the NJC rate. Second, NJC is very volatile and it may change course even in the span of one month. Third, there is no clear pattern about the co-movement between NJC and the change in the unemployment rate in the U.S. Fourth, the average of total NJC and private NJC since late 2010 are significantly higher than their respective historical averages and the volatility in NJC since the end of the Great Recession is not unusual by historical standards. Fifth, the size of NJC in the first decade of the 21st century has been the lowest along the entire sample. Finally, the most frequent drop in the unemployment rate is by 0.1 percent, and drops of more than 0.2 percent should not be highly expected.

Key Words: U.S. Net Job Creation; U.S. Unemployment Rate; U.S. Labor Force; The Great Recession.

JEL Classification: E24, J21, J60.

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# 1 Introduction

Recently, there has been a lot of discussion about net job creation (NJC) in the U.S. as the economy is recovering from the Great Recession. Many have been puzzled by the unrobust net job creation in the economy and the slow fall in the unemployment rate. This fact calls for comparing the behavior of net job creation in recent years to its past behavior in order to put matters in perspective.

This paper studies the evolution in the U.S. net job creation from January 1950 to December 2011. The paper focuses on the “aggregate” level of NJC rather than firm-level or industry-level NJC or other aspects of NJC. The main issues discussed in this paper are as follows. First, the size and volatility of NJC each month over time. Second, the co-movement between NJC and the changes in the unemployment rate. Third, the co-movement between NJC and the changes in the labor force. Fourth, comparing the behaviors of net job creation, the labor force and the unemployment rate since the start of the Great Recession with historical data to shed more light on the U.S. labor market of the last 4 years.

The main findings of the paper are as follows. First, in roughly 75 percent of the months reviewed, the U.S. economy had net job gains. The remaining months, but one, witnessed net job losses. The average and median of NJC in months with positive NJC have been slightly above 200 thousand. In months with net job losses, the average and the median have been around (-170) thousand and (-120) thousand, respectively. The overall average and median have been about 120 thousand and 150 thousand, respectively. Therefore, the U.S. economy had been creating roughly 1.5 million new jobs, on average, each year. Monthly NJC of at least 400 thousand was very rare.

Second, I show that NJC did not exhibit a significant trend over time, particularly since the 1960s. The average of net monthly created jobs is usually around 150-200 thousand. This is an interesting result given the significant increase in the U.S. population and labor force over time.

Third, the average of NJC in the last decade (2000-2009) was lower than in previous decades: a decline from an average of about 180 thousand in the 1990s to (-10) thousand in the 2000s. Ignoring 2008 and 2009, the monthly average remains very low-about 80 thousand. This average is very low even compared to the 1950s. Furthermore, if we consider only years with *positive* NJC, then the first decade of this century shows a slower NJC than historical standards- 135 thousand jobs on average each month,

compared to about 210 thousand jobs on average each month during the 1970-1999 period. In other words, a difference of about 900 thousand jobs each year, on average, compared to the previous three decades.

Fourth, NJC in the U.S. exhibited a big volatility- the monthly standard deviation of NJC is over 200 thousand and the average difference between NJC in two *consecutive* months is around 130 thousand (in absolute value). Also, moving from one month to the next, NJC can change direction- in more than 60 cases, NJC changed from positive to negative within a month. Similarly, in more than 60 occasions, NJC changed from negative to positive within a month. In more than 40 occasions, NJC changed from positive to negative and then to positive within two months. Therefore, changes in the direction of NJC are not uncommon in a historical perspective.

Fifth, there is no clear pattern about the co-movement between NJC and changes in the unemployment rate. In roughly one third of the time, a fall in the unemployment rate was accompanied by net job gains. However, in about 20 percent of the time, the unemployment rate increased despite net job gains and, in another 20 percent of the cases, the unemployment rate remained unchanged despite net job gains. In total, in more than 50 percent of the time with positive NJC, the unemployment rate did not fall that month. Also, in roughly one third of the months with negative NJC, the unemployment rate did not increase. The study thus does not suggest a clear negative relationship between the changes in the unemployment rate and NJC. Moreover, the likelihood of a rise in the unemployment rate in a month with net job losses is higher than the likelihood of a fall in the unemployment rate in a month with net job gains.

Sixth, Between December 2007 and December 2011, the U.S. economy lost about 120 thousand each month, on average. NJC has been more volatile than in previous periods, partially due to the movement from negative NJC during the first part of this sub-period to positive NJC in its second part. As said above, very high NJC volatility is not uncommon in a historical perspective. Furthermore, since October 2010, which was the last month with negative NJC, the average of monthly NJC has been above 150 thousand, which is higher than the historical average. The standard deviation actually decreased dramatically since October 2010 and the standard deviation since May 2009, the last official month of the Great Recession, was very similar to its pre-December 2007 level.

Seventh, the most likely change in the monthly unemployment rate is 0.1 (in absolute value), mainly in months with falls in the unemployment rate. In 53 percent of the months with negative changes in the unemployment rate, it dropped by 0.1 only. And, in 47 percent of the months with positive changes in the unemployment rate, it rose by 0.1 only. Monthly changes of 0.2 (in absolute value) are very likely too, with 20 percent of the monthly changes being by this size. In about 77 of the months during which the unemployment rate changed, the monthly change was up to 0.2 (in absolute value). Therefore, bigger changes in the unemployment rate, particularly bigger drops, are not very likely and they should not be expected to happen frequently.

Finally, private NJC constituted, historically, about 82 percent of total NJC in the U.S. economy and the rest of NJC is government-made. Since the beginning of the Great recession both types of NJC declined. But, since the end of the Great Recession, private NJC became positive whereas government NJC remained negative. Also, since October 2010, private NJC has been significantly higher than its historical average whereas government NJC continued to decline. On average, more than 170 thousand jobs were created, in net terms, by the private sector since October 2010.

There is a voluminous literature on the U.S. job creation, but most existing studies focus on the theoretical side of job creation, job creation at the micro-level or specific aspects of job creation.<sup>1</sup> Theoretically, Mortensen and Pissarides (1994) discuss endogenous job creation by firms; they post vacancies and meet unemployed job searchers. Their paper and the textbook of Pissarides (2000) provide the foundations for the well-known labor search and matching model that has become the main framework within which unemployment and vacancy creation are jointly studied.

Moscarini and Postel-Vinay (forthcoming) study the contributions of large and small U.S. employers at different stages of the business cycle and show that the relative growth rate of employment at initially large and small firms is strongly negatively correlated with the aggregate unemployment rate. Large firms grow faster than small firms when unemployment is low, and vice versa. On net terms, large employers destroy proportionally more jobs relative to small employers when

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<sup>1</sup> Job creation has also been studied in other countries or in the context of cross-country comparisons. See Haltiwanger, Scarpetta and Schwegler (2008) for a cross-country comparison at the firm-level, Hijzen, Upward and Wright (2010) for U.K. firm-level data and Ibsen and Westergaard-Nielsen (2011) for job creation by firms in Denmark.

unemployment is above trend, late in and right after a typical recession, and create more jobs when unemployment is below trend, late in a typical expansion.

The textbook of Davis, Haltiwanger and Schuh (1996) is among the best references for empirical job creation and destruction in the United States. It focuses on plant-level data of the U.S. manufacturing sector over 1972-1988 and describes the characteristics that destroy and create jobs over time (e.g. industry of origin, factor intensity, size, age wage payments, etc.). The authors show large, persistent, and highly concentrated gross job flows, with job destruction dominating the cyclical features of net job flows.

Davis and Haltiwanger (1992) measure the heterogeneity of employment changes at the establishment level in the U.S. manufacturing sector between 1972 and 1986. Heterogeneity is measured in terms of the gross job creation and destruction and the rate at which jobs are reallocated across plants. The gross rates of job creation and destruction are both very highly- roughly 10 percent of manufacturing employment in a given year. This phenomenon holds for different types of industries and across groups of plants defined in terms of plant age, size, region, and ownership type.

Davis, Faberman and Haltiwanger (2006) develop evidence about the magnitude and distribution of labor market flows in the cross section and over time. They characterize the relationship of hires, separations, quits and layoffs to the creation and destruction of jobs by individual employers. Their evidence suggests that the micro relations between worker flows and job flows are fairly stable over the business cycle despite being complex and nonlinear. Business cycle swings mainly involve shifts in the *distribution* of employer growth rates rather than big shifts in hires, separations and layoffs conditional on employer growth. They also show that some of the unusual aspects of the labor market downturn during and after the 2001 recession can be explained by the micro relations between worker flows and employment growth.

Haltiwanger, Jarmin and Miranda (2010) use data from the Census Bureau's Longitudinal Business Database (LBD) that track all firms and establishments in the U.S. non-farm business sector for the period 1976 to 2005. Their main result is that, controlling for firm age, there is no inverse relationship between net job creation and firm size, thus challenging the widespread perception that small businesses create most jobs in the U.S. economy.

Basker (2005) shows that Wal-Mart entry has a small positive effect on retail employment at the county level and a small negative effect on wholesale employment.

Saks (2008) examines the effects of housing supply regulations on metropolitan area housing and labor markets. She shows that housing supply regulations have lasting effects on metropolitan area employment in locations with relatively high degrees of housing supply regulations.

I take a different stand in this paper by considering NJC at the aggregate level. I see importance in doing this in order to gain better understanding about the ability of the U.S. economy as a whole to create jobs over time. In addition, the behaviors of the U.S. unemployment rate and NJC in recent years call for deeply studying their historical behaviors in order to put recent years in perspective. To my knowledge, this has not been addressed in the literature to date and this paper aims at filling this gap in the literature.

The remainder of the paper proceeds as follows. Section 2 describes the data used in this paper. Section 3 presents the main results of the study about net job creation. Section 4 describes evidence about the unemployment rate and its co-movement with NJC. Section 5 presents evidence about the labor force and its co-movement with NJC. Section 6 puts the period December 2007-December 2011 in a historical perspective. Section 7 presents analysis about NJC by the government and the private sector. Section 8 presents analysis of the NJC rate and section 9 concludes.

## **2 Data**

I use monthly data of the Bureau of Labor Statistics (BLS). The unemployment rate and the civilian labor force data are obtained from Table A-1 (“Household Data”). Net job creation data are available in Table B-1 (“Establishment Data”) and they measure the monthly change in total nonfarm payrolls. Data about private net job creation and government net job creation are also available in this table. All data are seasonally adjusted at the origin.

My sample spans over the period between January 1950 and December 2011. At the time of writing the first draft of this paper, data for 2012 are only partially available (and the available data are still subject to revisions). Therefore, I exclude 2012 from main sample. I, however, will briefly use whatever data available for 2012 in section 6 (which compares the period since December 2007 to historical data).

### 3 Net Job Creation

The main results about net job creation are presented in this section. I start by describing long-run trends, beginning by January 1950, and then move to comparisons between different years and decades. I later discuss some of the important features of net job creation in the U.S. during the period studied.

#### 3.1. Net Job Creation in the U.S.- An Overview

Figure 1 shows the monthly U.S. net job creation between January 1950 and December 2011 (together with a logarithmic trend line). The main insight that comes out of this graph is that the monthly NJC did not exhibit any upward trend over time. This is well reflected with the almost horizontal trend line (with the note that there is a slight downward trend, which is mainly a result of negative NJC in 2008-2009). With the exception of certain months, NJC moved between (-300) thousand and 300 thousand a month, with most of the positive NJC being around 150-200 thousand per month.

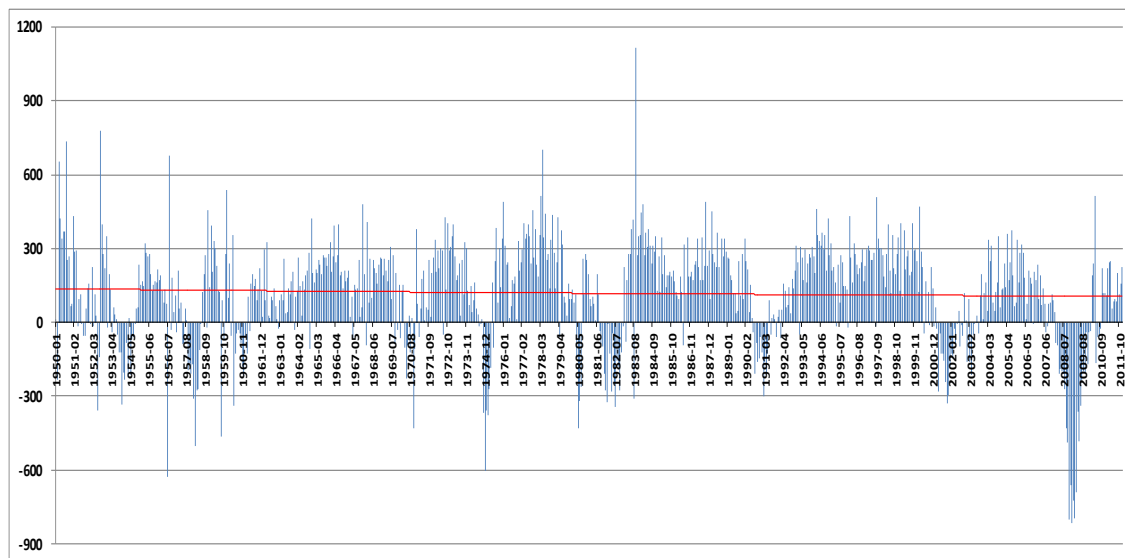


Figure 1: Monthly net job creation, 1950:1-2011:12.

The above finding is better seen in Figure 2, which presents the yearly averages of NCJ over the period 1950-2011. Once more, we can see that the average of NJC did not show a meaningful increase over time, certainly since the 1960s. In fact, the average of net job creation in the first decade of the 2000s slowed down compared to the previous 4 decades even after ignoring 2008 and 2009. Furthermore, the average of NJC in 2011



is not significantly low in a historical perspective, certainly not compared to the best years of the previous decade.

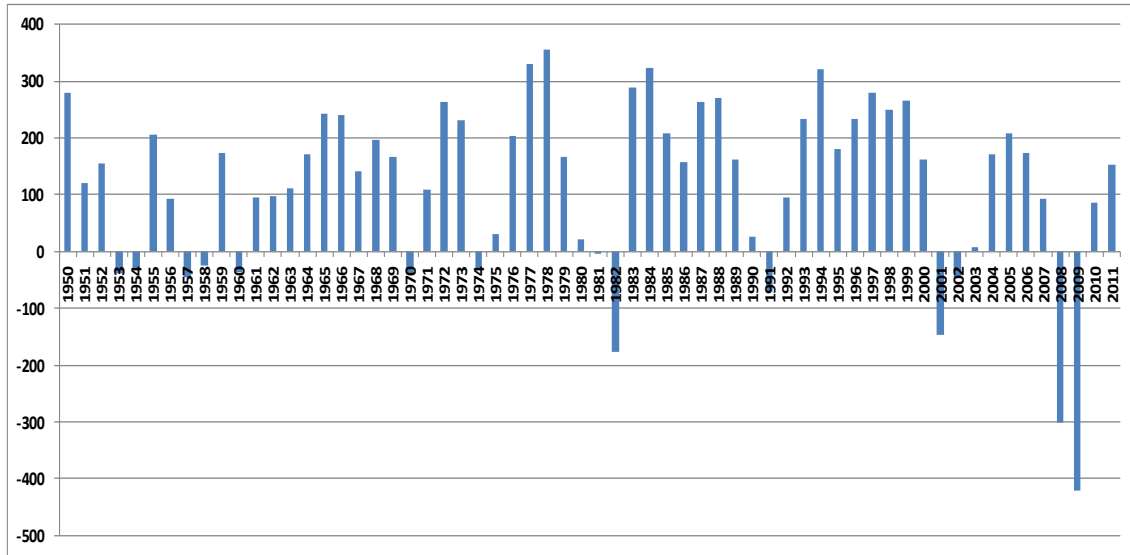


Figure 2: The average monthly net job creation by years, 1950-2011.

For completeness, I show the average of monthly NJC by decades (Figure 3). I show the results for all months (i.e. negative, zero and positive NJC) and for months with positive NJC only. For example, the number 89 under the “1950s” means that, during the 1950-1959 period, the average of NJC each month has been 89 thousand jobs. The number 171 means that for years with positive NJC only during the 1950s, the average monthly NJC has been 171 thousand jobs.

Taking all years into account, it is obvious that we did not observe a significant increase in the monthly NJC since the 1960s. In fact, the average NJC during the 2000s has been negative, albeit very small. This finding can obviously be attributed to the Great Recession and the slow start of the decade. But, it is very noticeable when compared to the average of the 1970s (with two major recessions during this decade). In fact, the average of NJC during the 1970s has been slightly better than the average of the 1980s and the second highest along the entire period considered (the 1990s are clearly the best). Finally, the first decade of the 21st century is the only decade with a negative NJC, on average.

In light of the “Great Recession” and to put the 2000s in a better perspective, I also present the average monthly job creation in years with positive NJC only. We now see

an improvement in the average of NJC between the 1960s and the following three decades. Interestingly, though, the average NJC did not change within three decades, moving around 210 thousand jobs a month. The 2000s emerge again as the weakest period, with an average of about 135 thousand jobs a month, down by about 75 thousand jobs a month (i.e. about 900 thousand a year!) compared to the previous three decades. We thus conclude that the low NJC during the 2000s can not only be attributed to the two recessions in the beginning and in the end of that decade.

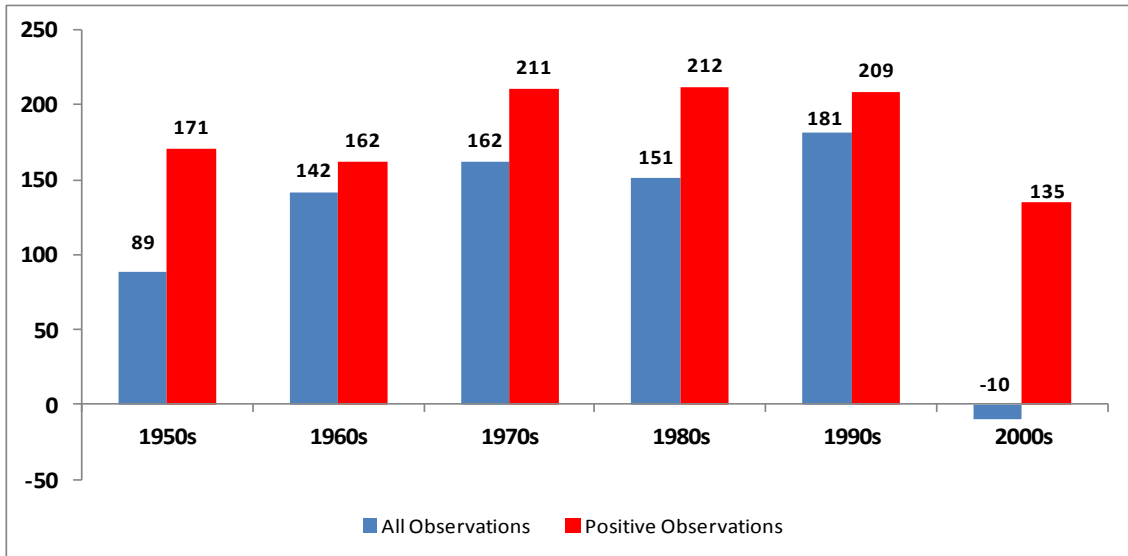


Figure 3: The average monthly net job creation by decades, 1950-2009.

The fact that over 6 decades the average number of jobs created did not exhibit any significant trend is an interesting observation. Since 1950, the U.S. population and the labor force more than doubled. Yet, the size of the monthly net job gains in the economy did not change (certainly not significantly). One possible explanation for this is the already low unemployment rate during this decade (before the last economic recession see below). When the economy is operating at a high employment rate, it is perhaps more difficult to increase job creation in net terms. But, this is still interesting and it is certainly different from the picture that comes out of the 1990s.

**3.2. Distribution of Net Job Creation in the U.S.**

This subsection shows the distribution of monthly NJC over the entire period, 1950:1-2011:12 (Figure 4). First, among the 744 months reviewed, NJC has been positive in

563 cases (i.e. about 76 percent of the time), negative in 180 cases and zero in a single case. Second, in months with positive NJC, the most likely monthly job gain is between 100 thousand and 300 thousand. NJC of more than 300 thousand is significantly less likely and NJC of more than 400 thousand is very unlikely (happened only in 2.5 percent of the time). Third, in months with net job losses, the most frequent number of job losses is below 50 thousand a month. Job losses of more than 50 thousand are also very likely. Net job losses of at least 500 thousand are very unlikely. In fact, 6 out of the 9 occasions with net job losses of at least 500 thousand occurred in the recent economic recession (in the months 2008:11-2009:4), with January 2009 being the worst month and November 2008 being the second worst since 1950.

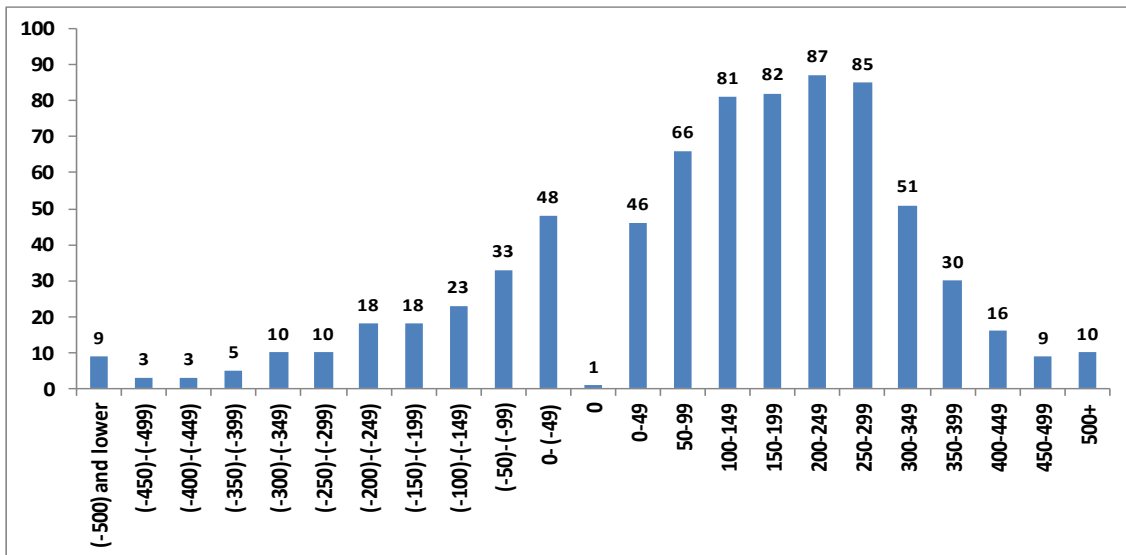


Figure 4: Distribution of monthly net job creation by size, 1950:1-2011:12.

### 3.3. Net Job Creation in the U.S.- Volatility and Monthly Changes

I now study the variation in the monthly net job creation over the period investigated. Recently, there has been a lot of discussion about the fact that net job creation in the U.S. is not robust enough in terms of magnitude. In this subsection, I study the changes in NJC between two consecutive months.

Figure 5 shows the change in NJC between two successive months. Clearly, moving from one month to the next, NJC can vary dramatically. The difference between two months can easily exceed 200 thousand jobs. Changes of up to 200 thousand jobs remain the most likely figures, though. In either case, the changes are fairly big

considering the frequency of the data. As Figure 5 also suggests, NJC in a given month may also fall dramatically compared to the previous month. In this regard, changes of up to (-200) thousand are the most likely and changes beyond (-200) thousand are highly likely too.

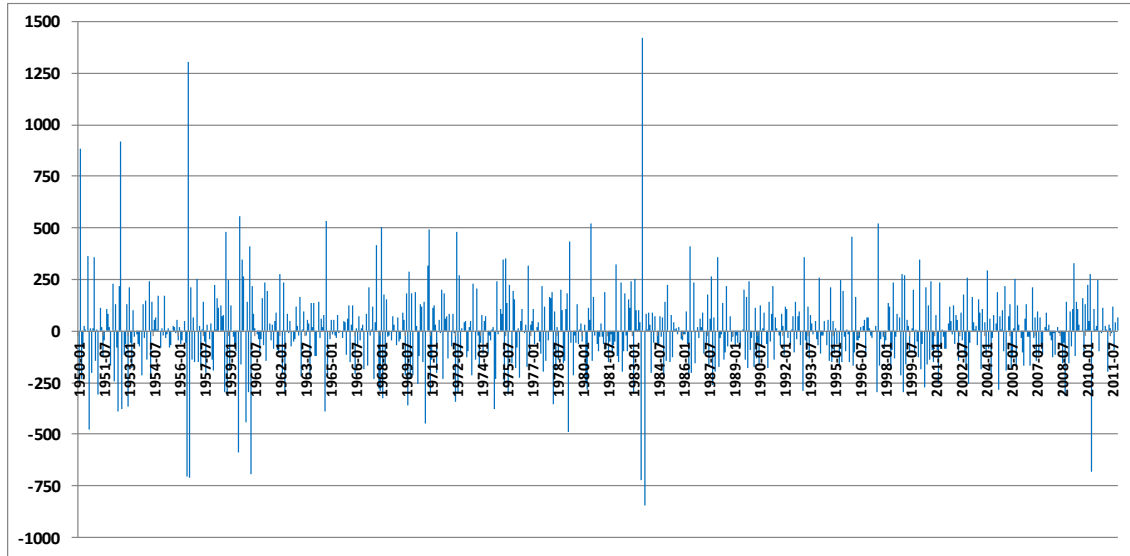


Figure 5: Monthly changes in net job creation, 1950:2-2011:12.

NJC may also change direction in the span of one month. In 63 cases, NJC became negative after being positive in the previous month. In 62 cases, NJC turned positive after being negative in the previous month. In 43 case, NJC moved from positive to negative and then to positive in three successive months. And, in 17 cases, the opposite happened. Therefore, not only that significant changes in the size of NJC are possible, but NJC can also change course so quickly. Robust and steady NJC on a monthly basis is not the typical theme. In this regard, the standard deviation of the U.S. net job creation is 214 thousand.

The unrobust net job creation is also observed at the annual frequency. As Figure 2 suggests, moving from one year to the following, NJC vary significantly (the periods 1983-1989 and 1993-1999 serve as good examples). Therefore, even after “smoothing” the changes in net job creation by using low frequency data, the variations between one period and the next are still very meaningful. Interestingly, this variation may occur in a certain period of time even though no major economic event happened (e.g., sliding into a recession after a period of expansion).

### 3.4. Net Job Creation in the U.S.- Monthly Averages

Even though the data are seasonally adjusted, I check whether NJC differs between different months within the year. For this reason, Figure 6 presents the average of NJC by months (For example, during 1950-2011, the average number of jobs created in January has been 106 thousand jobs). We can see that the weakest NJC occurs usually around the middle of a year, in June and July. NJC thus does slow down during the summer even after correcting for seasonality. On the other hand, March, April and November are clearly better than the average.

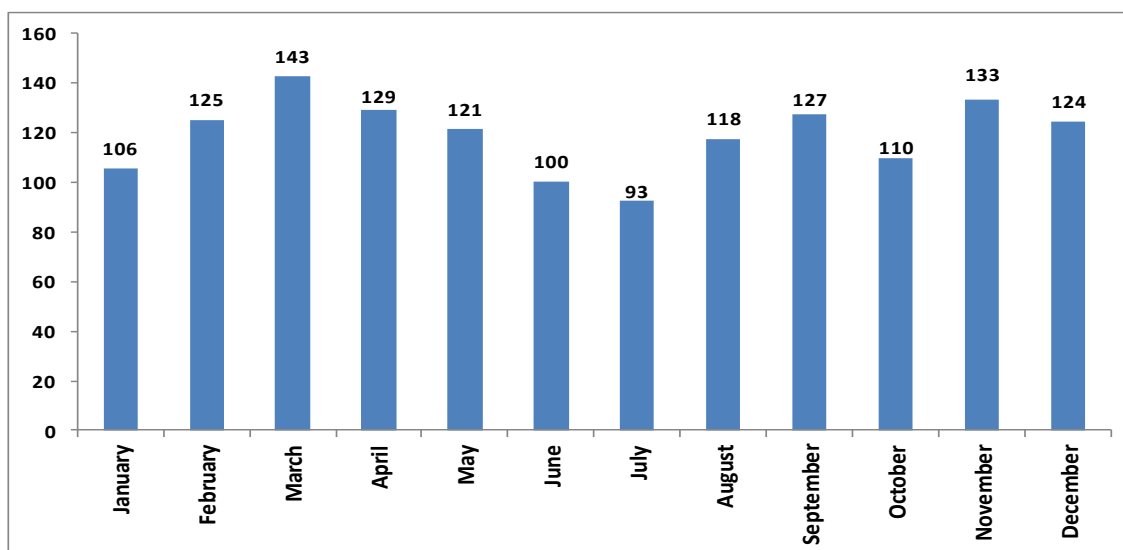


Figure 6: The average monthly net job creation by months, 1950:1-2011:12.

## 4 The Unemployment Rate

So far, we looked at the actual net job creation. I turn now to studying the behavior of the monthly unemployment rate along the same period. The main goal of this section is to study the co-movement between the change in the unemployment rate and NJC.

### 4.1. The U.S. Unemployment Rate- An Overview

The unemployment rate is depicted in Figure 7. It rose from the early 1950s, peaked during the early 1980s (passing the 10 percent landmark) and then experienced a drop until reaching about 4 percent in the late 1990s and 2000. The unemployment rate increased dramatically since 2007, reaching the peak of 10 percent in October 2009. At the end of the sample (December 2011), the unemployment rate stood at 8.5 percent.

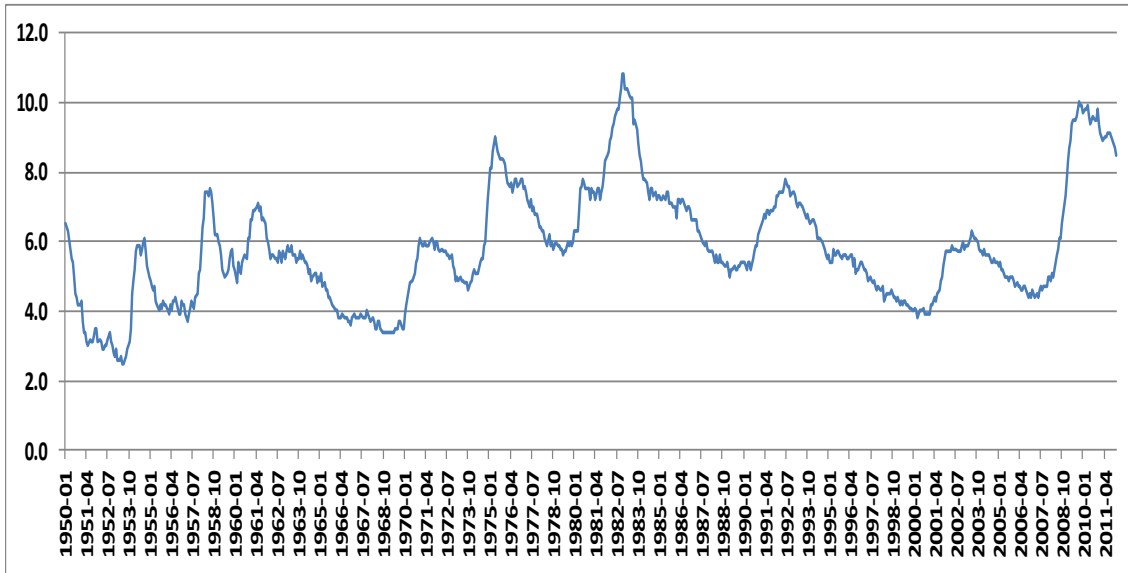


Figure 7: Monthly unemployment rate, 1950:1-2011:12.

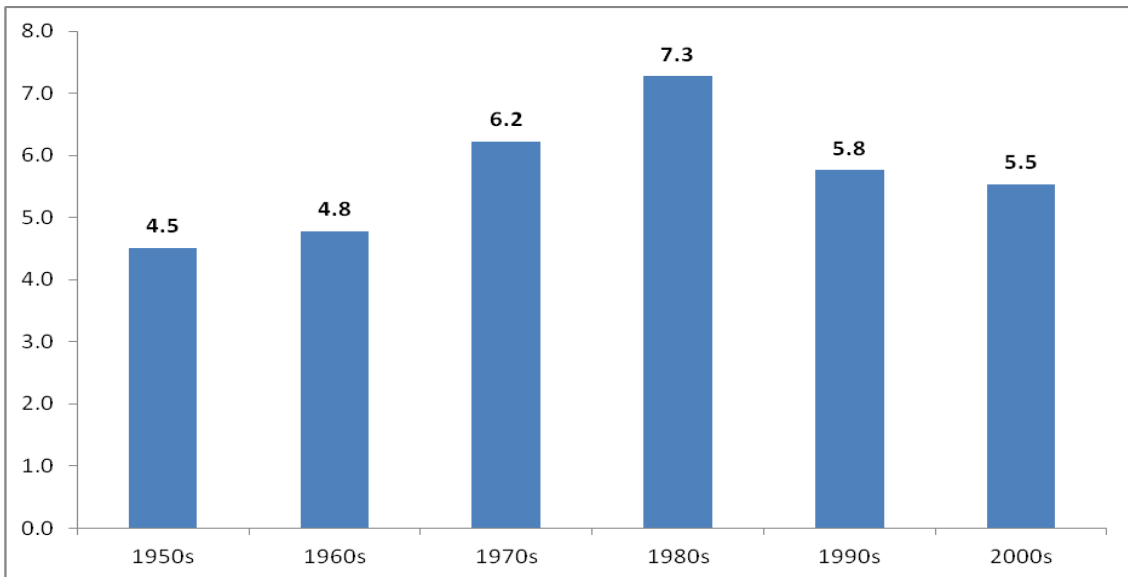


Figure 8: The average unemployment rate by decades, 1950-2009.

Figure 8 presents the average unemployment rate by decades. The 1970s and the 1980s had the highest unemployment rates, on average, along the entire period (and they are the only decades with more than 6 percent, on average). The most interesting observation, however, is that the average unemployment rate during the 2000s was the lowest since the 1960s. This is mainly interesting considering the fact that the U.S. economy lost jobs in net terms during this decade (see Figure 3 above). This fact

suggests that NJC may tend to be lower (but, obviously, not negative) when the unemployment rate is low. All and all, this is an interesting observation on itself.

**4.2. Distribution of Changes in the Unemployment Rate in the U.S.**

I show here the distribution of the monthly changes in the unemployment rate over the sample period, 1950:1-2011:12 (Figure 9). The main observation can be summarized as follows. First, in one fourth of the cases, the unemployment rate did not change from one month to the next. Second, the unemployment rate dropped in about 40 percent of the time and rose in about 36 percent of the time. Third, the most likely change in the monthly unemployment rate is 0.1 (in absolute value). This is particularly true for monthly falls in the unemployment rate- in 53 percent of the months with fall in the unemployment rate, it dropped by 0.1 only. Monthly changes of 0.2 (in absolute value) are also very likely- they account for about 20 percent of the observations. Together, in roughly 77 percent of the months with non-zero changes in the unemployment rate, it changed by either 0.1 or 0.2 (in absolute value). Drops of up to (-0.2) occurred in about 80 percent of the months with negative changes in the unemployment rate, and increases of up to 0.2 occurred in about 75 percent of the months with positive changes in the unemployment rate. Fourth, bigger changes (in absolute value) in the unemployment rate are possible, but they are significantly less likely.

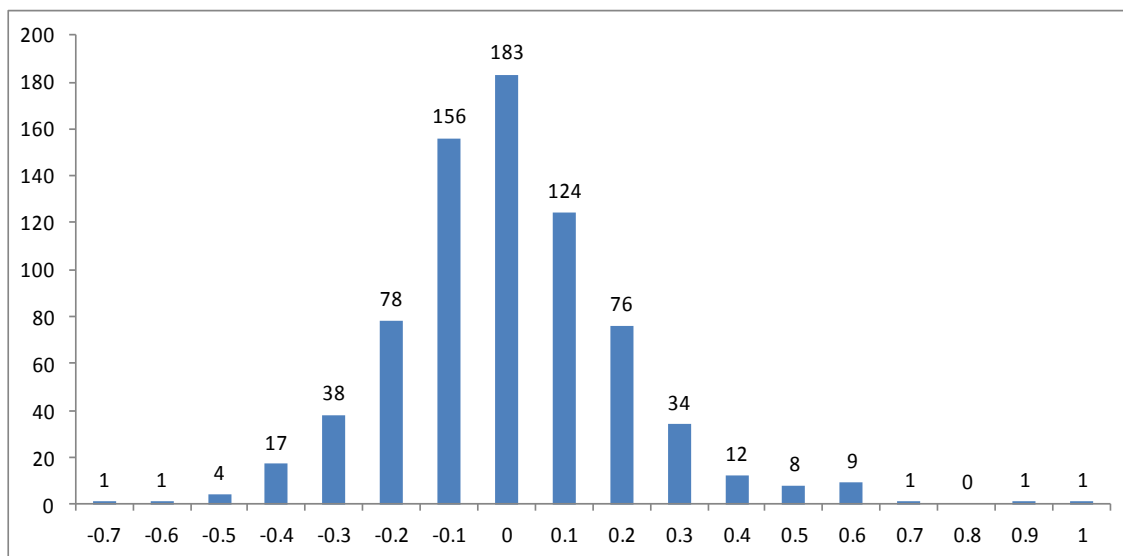


Figure 9: Distribution of the monthly changes in the unemployment rate by size, 1950:1-2011:12.

### 4.3. Net Job Creation and the Unemployment Rate Co-movement in the U.S.

As said in the introduction, the changes in the U.S. unemployment rate and their co-movement with NJC since the end of the Great Recession have been in the center of discussions. Motivated by this discussion, this subsection studies the co-movement between NJC and the change in the unemployment rate with the attempt to draw any useful insights that may help in putting the last three years in a better perspective.

Table 1 summarizes the main findings. In more than half of the occasions with net job gains, the unemployment rate did not decline in the same month. Actually, in one fourth of the occasions it increased despite net addition of jobs. In more than one third of the months with net job losses, the unemployment rate did not rise. In several occasions, the unemployment rate dropped despite losing jobs. Putting facts together, in 49 percent of the cases, the expected negative correlation between NJC and the change in the unemployment rate was not observed. Furthermore, in one fourth of the cases, positive correlation is observed between NJC and the change in the rate of unemployment. Also, the likelihood that a month with net job losses is associated with a rise in the unemployment rate is significantly higher than the likelihood that a month with net job gains is associated with a fall in the unemployment rate. This asymmetry is clearly observed in Table 1.

	$\Delta u > 0$	$\Delta u = 0$	$\Delta u < 0$	<b>Total</b>
<b>Positive NJC</b>	148	152	263	563
<b>Negative NJC</b>	117	31	32	180
<b>Total</b>	265	183	295	743

Table 1: Summary of NJC and changes in the unemployment rate ( $\Delta u$ ).

The fact that the unemployment rate may increase in periods with net job gains implies a bigger increase, in percentage terms, in the labor force than in NJC during the same month. Furthermore, the fact that the positive correlation between net job creation and the change in the unemployment rate is mainly observed in months with net job gains lead to another interesting conclusion: the likelihood that the labor force expands *more* than the expansion in employment during periods of expansion is bigger than the likelihood that the labor force contracts *more* than the fall in employment during periods of contraction. In other words, when employment is increasing it is



more likely to see more people joining the labor force than the probability to see people exiting the labor force when employment is falling.

To shed some light on the result of non-negative correlation in roughly half of the occasions between NJC and the change in the unemployment rate, Table 2 presents more details about the size of NJC for each of the entries of Table 1. Consider first months with net job gains. The non-negative correlation between NJC and the change in the unemployment rate happened, on average, with relatively lower NJC. However, months with both net job gains and rise in the unemployment rate still had a very high NJC- around 180 thousand jobs on average. Furthermore, the unemployment rate increased even in months with NJC of more than 200 thousand, which is a very high number in historical standards. Notice also that NJC of less than 100 thousand, 100-199 thousand and 200-299 thousand have almost the same likelihood, implying no dominant category in the first column of the table. Similarly, Months with no change in the unemployment rate despite net job gains occurred despite an average of about 200 thousand jobs and the fact that the economy gained more than 200 thousand, and even 300 thousand jobs, during that month.

	Positive Net Job Creation			Negative Net Job Creation		
$\Delta u$	$\Delta u > 0$	$\Delta u = 0$	$\Delta u < 0$	$\Delta u > 0$	$\Delta u = 0$	$\Delta u < 0$
<b>JC Average</b>	181	196	237	-207	-128	-67
<b>JC Median</b>	154	197	228	-161	-93	-41
<b><math>\Delta u</math> Average</b>	0.16	0	-0.18	0.27	0	-0.15
<b><math>\Delta u</math> Median</b>	0.10	0	-0.10	0.20	0	-0.10
<b><i>Size of NJC</i></b>	<i>Number of Observations</i>			<i>Number of Observations</i>		
<b>&lt; 100</b>	45	30	37	39	16	26
<b>100-199</b>	41	47	75	30	9	2
<b>200-299</b>	38	54	80	23	2	3
<b>300-399</b>	17	18	46	11	3	1
<b><math>\geq 400</math></b>	7	3	25	14	1	0
<b>Total</b>	<b>148</b>	<b>152</b>	<b>263</b>	<b>117</b>	<b>31</b>	<b>32</b>

Table 2: Detailed Summary of changes in the unemployment rate and NJC. The size of NJC is in absolute value.

Months with net job losses show a bit different pattern. In this case, a fall in the unemployment rate despite net job losses is mainly likely when the economy losses up to 100 thousand jobs. A net loss of at least 200 thousand jobs in a given month is likely to be joined by an increase the unemployment rate that month (happened in roughly 83 percent of the cases). Therefore, unlike the opposite case (simultaneous rise in NJC and the unemployment rate), a fall in the unemployment rate despite net job losses is mainly restricted to relatively small net job losses (this is well reflected in the big differences between the averages of each category). Notice, however, that the average of net job losses has been lower (in absolute value) than the average of net job gains, which also makes the average number of (net job losses,  $\Delta u < 0$ ) relatively lower.

I close this subsection with Figure 10, which presents monthly NJC vs. the change in the unemployment rate. The figure indicates a negative association between both variables, but the association is relatively low ( $R^2=0.27$  and a small slope in absolute value). The first quadrant of the figure clearly illustrates how job gains can be associated with increases in the unemployment rate. Furthermore, the monthly increase in the unemployment rate can be very large (about 0.3-0.4 percent) with an average of 0.16 percent. Similarly, the average fall in the unemployment rate during periods of net job losses is also empirically meaningful (-0.15 percent). Summing up, we observe no clear pattern regarding the co-movement between NJC and the change in the unemployment rate, mainly in months with net job gains.

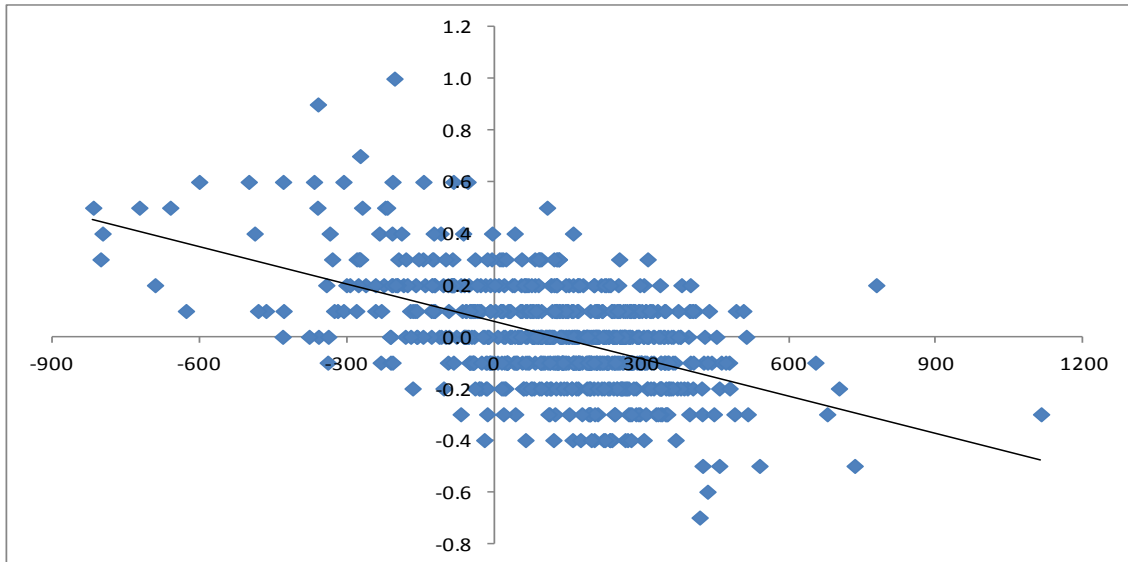


Figure 10: NJC (horizontal axis) vs. change in the unemployment rate (vertical axis).

## 5 The Labor Force

So far, I reviewed the evolution in the unemployment rate and NJC and their co-movement. The previous sections have been silent about the behavior of the labor force. In this section, I show the behavior of the labor force in the U.S. over the years with the hope to draw some useful insights about the behavior of NJC.

Figure 9 shows the evolution in the changes in labor force ( $\Delta LF$ ) along the entire sample period. Similar to the case with net job creation, the changes in the labor force did not feature a trend over time. Normally,  $\Delta LF$  fluctuates each month within the range of (-200) thousand and 400 thousand. The average change and the median of  $\Delta LF$  have been 124 thousand and 123 thousand, respectively. The average of  $\Delta LF$  is thus very similar to the average of NJC.

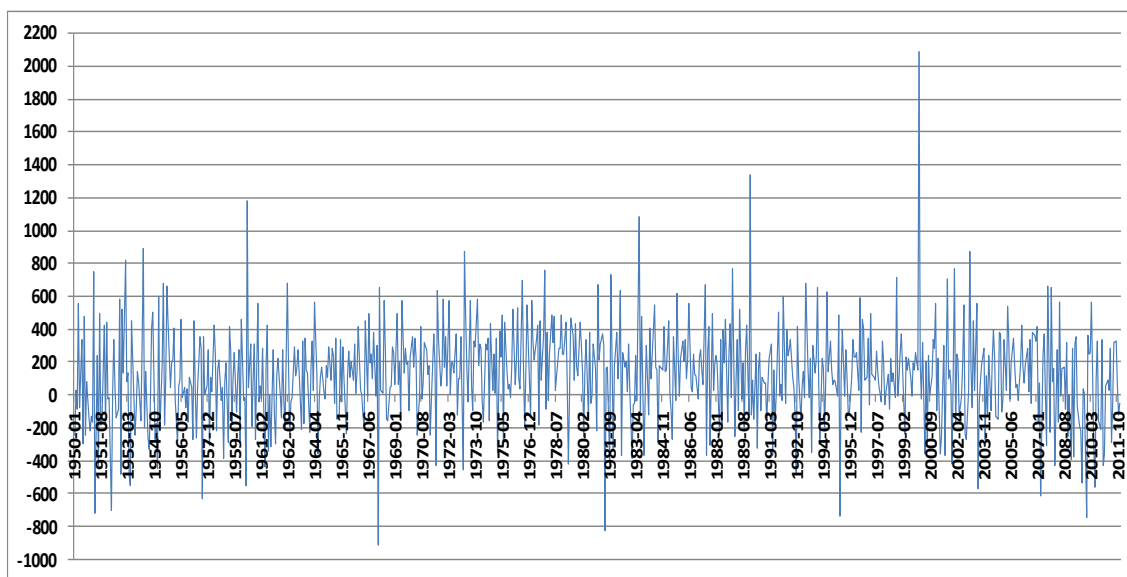


Figure 11: Monthly labor force, 1950:1-2011:12.

As expected, the labor force is usually expanding. During the entire period considered, the labor force increased 511 times (which are roughly 69 percent of the time) and contracted 233 times. No zero change in the labor force was recorded during the entire period. Recall that in roughly 76 of the time, NJC creation was positive, implying that a decline in the labor force is (slightly) more likely than a decline in NJC.

I next study the co-movement between NJC and  $\Delta LF$ , summarized in Table 3. In roughly 78 percent of the cases with positive  $\Delta LF$ , NJC has been positive as well. In all remaining cases, but one, NJC has been negative. On the other hand, NJC has been

negative in only 29 percent of the months with negative  $\Delta LF$ . In all remaining months, NJC increased during months with a declining labor force. This asymmetry in the comovement of NJC and the labor force is interesting- they tend to rise together (in about 4 out of 5 cases), but they do not tend to decline together.

The fall in the labor force during periods of expanding employment may result from a lag in the behavior of the labor force relative to employment. Consider, for example, recent years- the economy is gaining jobs, but the labor force is actually declining, albeit relatively moderately. Discouraged people may exit the labor force if they feel that, even though the economy is gaining jobs, this gain is not big enough for them to find jobs. This process may continue until NJC becomes very robust and growing in magnitude.

	Positive Net Job Creation		Negative Net Job Creation	
$\Delta LF$	$\Delta LF > 0$	$\Delta LF < 0$	$\Delta LF > 0$	$\Delta LF < 0$
<b>JC Average</b>	150	360	-171	-165
<b>JC Median</b>	155	337	-125	-102
$\Delta LF$ Average	277	-168	240	-265
$\Delta LF$ Median	237	-140	213	-231
<b><u>Size of NJC</u></b>	<u>Number of Observations</u>		<u>Number of Observations</u>	
<b>&lt;100</b>	112	0	48	33
<b>100-199</b>	163	0	27	14
<b>200-299</b>	123	49	17	11
<b>300-399</b>	0	81	11	4
<b>&gt;=400</b>	0	35	9	6
<b>Total</b>	<b>398</b>	<b>165</b>	<b>112</b>	<b>68</b>

Table 3: Detailed Summary of changes in the labor force and NJC. The size of NJC is in absolute value. Note: no observation with  $\Delta LF = 0$ .

## 6 December 2007-December 2011 in a Historical Perspective

This section attempts to put the period since the onset of the Great Recession in a good perspective. For this purpose, I present summary statistics about net job creation, the change in the labor force and the change in the unemployment rate during this period and compare them to historical data. Table 4 presents some descriptive statistics about

NJC, the change in the labor force and the change in the unemployment rate for the entire period investigated, for the period prior to the Great Recession and for the period since the official start of the Great Recession (December 2007).<sup>2</sup>

Clearly, since the beginning of the Great Recession, the average of net job losses has been very high- on average, the economy lost about 1.4 million jobs each year. This average, however, is highly biased because of 2008-2009 as can be understood from the median value (a loss of 612 thousand jobs on average each year). During this period, the difference between the median and the mean have been very large compared to the period before December 2007. In addition, NJC displayed much higher volatility than in the first sub-period. This is also true if we consider the Coefficient of Variation (the ratio of the standard deviation to the mean).

		1950:1-2011:12	1950:1-2007:11	2007:12-2011:12
NJC	Average	119	136	-116
	Median	148	159	-51
	Std. Dev.	214	194	319
$\Delta LF$	Average	124	132	1
	Median	123	135	28
	Std. Dev.	294	292	302
$\Delta u$	Average	0.00	0.00	0.08
	Median	0.00	0.00	0.10
	Std. Dev.	0.20	0.20	0.23

Table 4: Summary Statistics of monthly NJC, the change in the unemployment rate and the change in the labor force by sub-periods, 1950:1-2011:12.

Prior to the Great Recession, the labor force has been increasing by about 1.6 million each year, on average. Since the beginning of the Great Recession, however, there has been virtually no growth in the labor force (increased by a *total* of roughly 50 thousand since late 2007). The volatility in the change in the labor force increased only slightly, but the Coefficient of Variation increased dramatically. Notice also that, despite being higher than the average, the median change in the labor force has been relatively muted and significantly lower than its historical value.

<sup>2</sup> According to the Business Cycle Dating Committee of the National Bureau of Economic Research, the recession started in December 2007 ended in May 2009. See NBER (2010).

In Table 5, I consider only the period since December 2007 and divide it into sub-periods (with the recognition that each sub-period is relatively short). I first compare the official period of the Great Recession as was announced by the NBER's Business Cycle Dating Committee (2007:12-2009:5) to the period after the official end of the recession. Since June 2009, the economy was gaining jobs on the pace of roughly 0.5 million jobs a year. Additionally, NJC has stabilized compared to 2007:12-2009:5, as clearly indicated by the standard deviation (notice also that the standard deviation since June 2009 is very similar to its historical average).

Even though NJC has been positive on average since June 2009, the economy suffered from months with net job losses between June 2009 and September 2009. The latter was the last month with negative NJC. For this reason, the last column of Table 5 considers the period since October 2010. Clearly, NJC speeded up and, on average, it is very similar to its long-run average (see Table 4). NJC also became very stable compared to the recession period and compared to the historical volatility.

		2007:12- 2011:12	2007:12- 2009:5	2009:6- 2011:12	2010:10- 2011:12
NJC	Average	-116	-384	39	153
	Median	-51	-318	85	121
	Std. Dev.	319	303	206	67
$\Delta LF$	Average	1	54	-29	-2
	Median	28	120	11	28
	Std. Dev.	302	287	311	250
$\Delta u$	Average	0.08	0.26	-0.03	-0.07
	Median	0.10	0.30	0.00	-0.10
	Std. Dev.	0.23	0.20	0.16	0.17

Table 5: Summary Statistics of monthly NJC, the change in the unemployment rate and the change in the labor force by sub-periods, 2007:12-2011:12.

Interestingly, during the period of the recession, the labor force kept increasing (by more than 50 thousand each month, on average). However, since June 2009, the labor force was shrinking despite the official end of the recession (declined by about 900 thousand). This fact may be attributed to the high unemployment rate, that persisted

since the official end of the recession, which led people to exit the labor force. The labor force showed virtually no change since the third quarter of 2010.

Summarizing, the average NJC since October 2010 has been satisfying enough in historical standards. Furthermore, if we include the available data for the first three months of 2012, the average of NJC since October 2010 is 166 thousand jobs. The volatility in NJC in the last year and a half is not unusual in historical standards and the urobust path of NJC should not be surprising.

## 7 Private, Government and Total Net Job Creation

So far, I considered total net job creation in the economy (by both the private-sector and the government). This subsection considers each category individually. I start by describing NJC in the private sector over the entire period investigated (Figure 12). The behavior of government NJC can be inferred from Figure 1 and Figure 12.

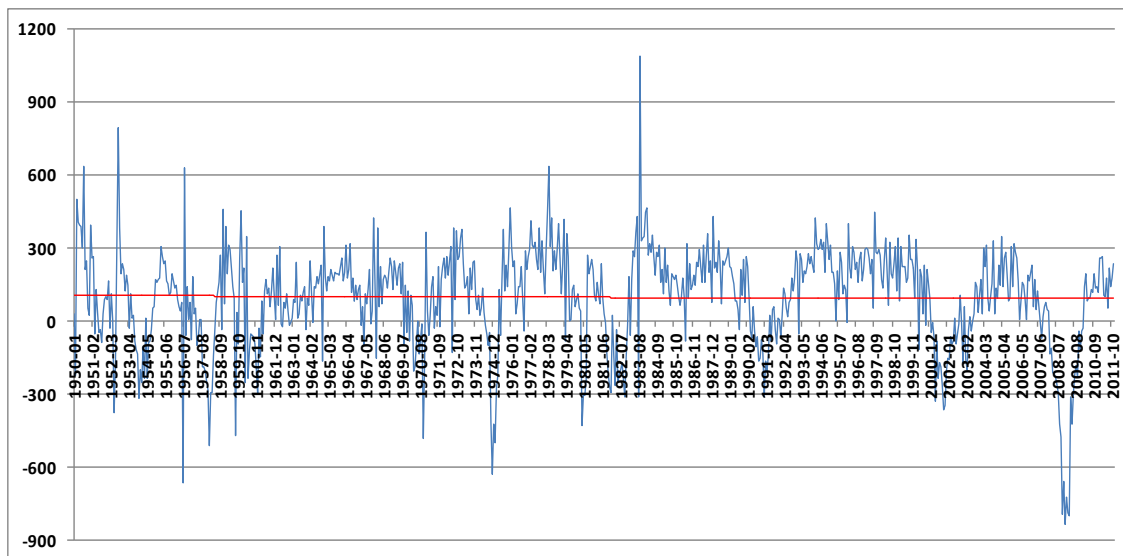


Figure 12: Monthly private net job creation, 1950:1-2011:12.

Similar to total NJC (Figure 1), private-sector NJC showed no increase over time and it displayed big variation from one month to the next. Most of the variation in total NJC thus is coming from the private-sector NJC, as expected given the high proportion of private-sector jobs in the total number of jobs. Also, even though the volatility of net government-created jobs is significantly lower than the volatility of private-sector-created jobs, the volatility in the government sector is very high relative to the mean

(CV of about 2). New government jobs acts as a “shock absorber”, thus reducing the overall volatility of NJC.

Table 6 presents summary statistics of NJC of the government, the private sector and total NJC for the entire sample and for three sub-samples. Prior to December 2007, the private sector has been creating 5 out of every 6 new jobs, on average. Remarkably, that did not change since the onset of the Great Recession. The number of jobs gained in the government sector declined since the beginning of the Great Recession almost at the same pace as the newly created jobs in the private sector did. In fact, since October 2010, the average private-sector net job gain has been about 170 thousand, while government jobs kept declining at about 20 thousand jobs each month, thus holding down the rise in total nonfarm jobs in the economy. The private-sector NJC since October 2010 is significantly higher than the long-run average.

		<b>1950:1- 2011:12</b>	<b>1950:1- 2007:11</b>	<b>2007:12- 2011:12</b>	<b>2010:10- 2011:12</b>
<b>Private</b>	Average	98	112	-110	172
	Median	129	139	-27	175
	Std. Dev.	207	189	318	65
<b>Government</b>	Average	22	24	-7	-18
	Median	23	24	-9	-15
	Std. Dev.	46	41	89	27
<b>Total</b>	Average	119	136	-116	153
	Median	148	159	-51	121
	Std. Dev.	214	194	319	67

Table 6: Summary Statistics of monthly total NJC, private NJC and government NJC, by sub-periods, 1950:1-2011:12.

## 8 Net Job Creation Rate

So far, the focus has been on actual NJC and its co-movement with the changes in the unemployment rate and the labor force. In this section, I study the NJC *rate* to see whether the main results of the paper are robust to the normalization of NJC to the size of the employment rate. I define NJC rate for a month  $t$  as the ratio of NJC of month  $t$  over the average of employment in months  $t-1$  and  $t$ . In so doing, I follow Davis, Faberman and Haltiwanger (2006), but with a different data frequency.



The monthly NJC rate is presented in Figure 13. Up to the late 1970s, the NJC rate fluctuated mainly in the range of (-0.5) percent to 0.5 percent a month, but it did not exhibit any significant trend during this period. Noticeably, the fluctuations during the 1950s have been relatively big compared to other years. Since the middle of the 1980s, however, the NJC rate started to decline even though the fluctuations became smaller in their size. Months with positive NJC in the last 3 decades have lower NJC rates, but months with negative NJC have also lower NJC rates (in absolute value).

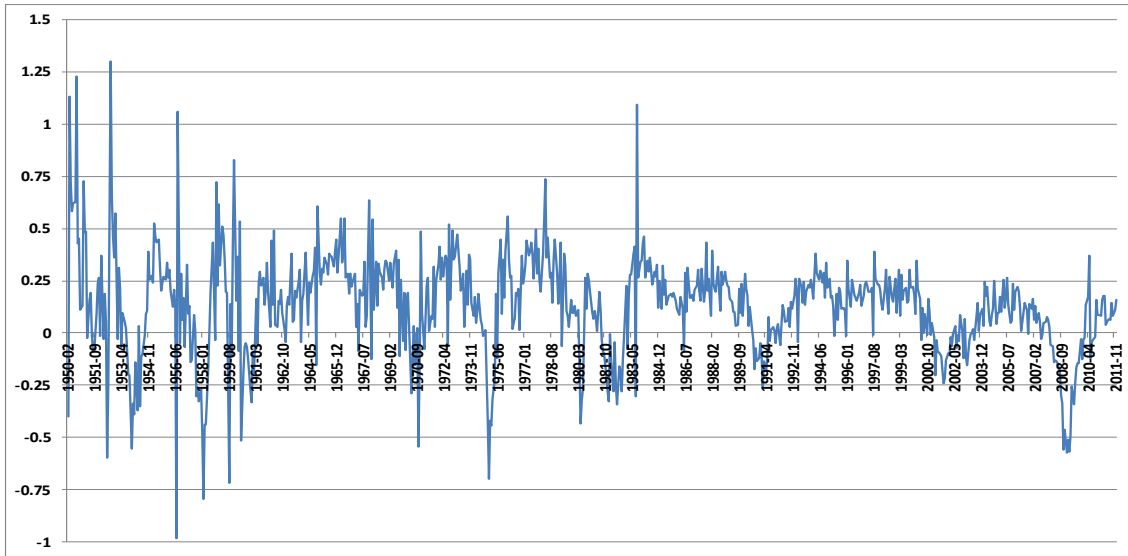


Figure 13: Monthly net job creation rate (in percents), 1950:1-2011:12.

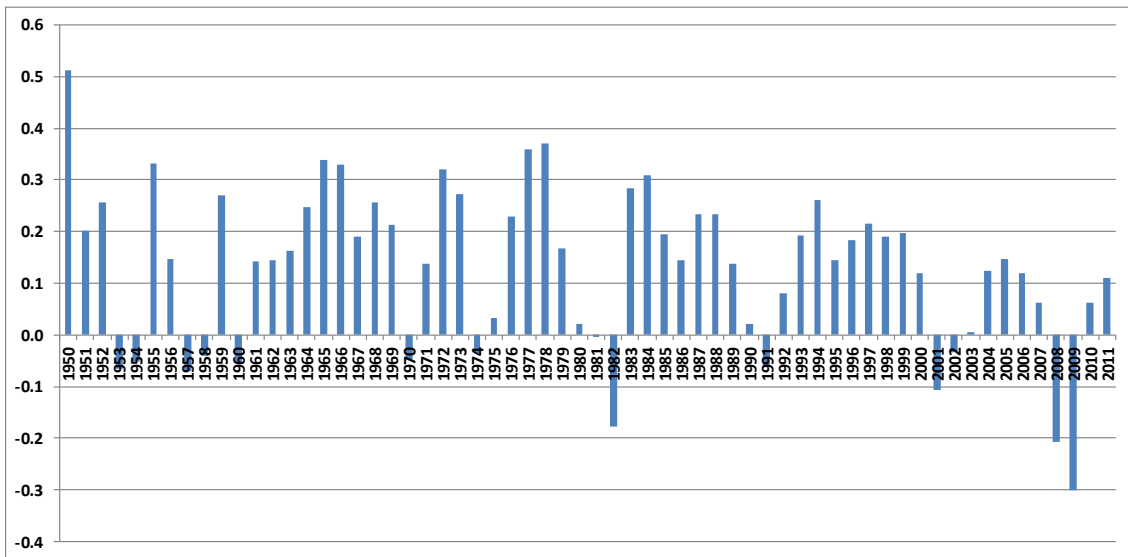


Figure 14: The average monthly net job creation rate by years (in percents), 1950-2011.

In Figure 14, I show the average monthly NJC rate by years. We again learn about the decline in the NJC rate since the middle of the 1980s. NJC rates were very low during the 2000s, including the period between the two economic recessions. This is another confirmation to what has been shown in previous sections about the low net job creation in the U.S. even with the exclusion of 2001 and 2008-2009. Those years are clearly weak compared to the preceding decade.

## 9 Conclusions

This paper studies the behavior of U.S. net job creation over the period 1950-2011. The paper attempts to put the recent behavior of net job creation and its co-movement with the changes in the unemployment and the labor force in a better perspective.

The paper has few important findings. First, despite the considerable increase in the size of the U.S. population and labor force, the average monthly NJC did not exhibit a significant trend over time, mainly since the 1960s. Second, moving from one month to the following, NJC exhibited large variations- possibly moving from positive to negative and vice versa. Third, there is no clear association between the evolution in NJC and the change in the unemployment rate in the same month- in more than half of the months with net job gains, the unemployment did not fall. And, in more than one third of the months with net job losses, the unemployment rate did not increase during the same month. Fourth, since October 2010, which was the last month with negative NJC, the average of NJC has been higher than the historical average. Finally, in more than 50 percent of the months with falls in the unemployment rate, it dropped by 0.1 percent only. A rise of 0.1 percent is also the most frequent change during periods with positive changes in the unemployment rate. Changes of 0.2 percent (in absolute value) are also very likely, but changes of more than 0.2 percent are far less likely. We thus should expect to see monthly drops in the unemployment rate of only 0.1-0.2 in the vast majority of the months (indeed, the average drop in the unemployment rate is 0.18 percent and the average increase is 0.21 percent).

This paper is part of an effort to study the behavior of the U.S. net job creation and the unemployment rate in an attempt to better evaluate their recent behaviors as the economy is recovering from the Great Recession. This is a very timely issue which magnifies the importance of such a study.

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