Employer-to-Employer Flows in the U.S. Labor Market:
The Complete Picture of Gross Worker Flows[1]

by

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Abstract

Despite the importance of employer-to-employer (EE) flows to our understanding of labor market and business cycle dynamics, the literature has lacked a comprehensive and representative measure of the size and character of these flows. To construct the first reliable measures of EE flows for the United States, this paper exploits the "dependent interviewing" techniques introduced in the Current Population Survey in 1994. The paper concludes that EE flows are large: On average 2.6 percent of employed persons change employers each month, a flow more than twice as large as that from employment to unemployment. Indeed, on-the-job search appears to be an important element in hiring, as nearly two-fifths of new jobs started between 1994 and 2003 represented employer changes. EE flows are also markedly procyclical, although the cyclicality is concentrated around the recession: EE flows did not increase as the labor market tightened between 1994 and 2000, but they did drop sharply as the labor market loosened during the period 2001 through 2003. We view the uneven cyclical pattern of EE flows as a pattern to be incorporated into future models.

1. Introduction

A large literature on the macroeconomics of the labor market has emphasized the role of gross flows of both workers and jobs. Much of this literature has used search and matching models, perhaps best exemplified by Mortensen and Pissarides (1994), to capture the dynamics of the labor market. Most early examples of this type of model ruled out on-the-job search and the movement of workers directly from one employer to another – partly for analytical convenience, and partly because employer-to-employer (EE) flows were difficult to measure in the aggregate.[2] Tobin (1972) criticized the exclusion of on-the-job search from early search models. He argued that the restriction could be justified only if on-the-job search is substantially less efficient than searching while unemployed, which he did not believe it to be, at least for many occupations. Indeed, casual observation, and the occasional estimates of EE flows that have appeared in the literature, suggest that on-the-job search is important.[3] In addition, ignoring on-the-job search can lead to mismeasurement of the parameters of the matching function, which are critical in many models of business cycle dynamics and of hysteresis (Anderson and Burgess 2000, van Ours 1995). Consequently, more recent models of labor market dynamics include a prominent role for on-the-job search and associated movements from one employer to another without significant intervening periods of nonemployment (Mortensen 1994, Pissarides 1994, Davis and Haltiwanger 1999, Eriksson and Gottfries 2000, Petrongolo and Pissarides 2001).[4]

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[2]Recognizing the empirical importance of quits (see note 3), the search models in Parsons (1973) and Burdett (1978) allowed for on-the-job search in their models.

[3]Mattila (1974) found that about 60 percent of workers lined up new jobs before leaving their old jobs; of course, not all workers moving more-or-less directly from one employer to another quit their previous job. See section 5 below.

[4]The potential for large employer-to-employer flows is also a critical premise underlying the literature that seeks to explain wage contracts as a way to reduce turnover, including an important class of efficiency-wage models (for example, Bester 1989), and of models of implicit contracts whose enforcement depends upon internal reputation (for example, Bull 1987). Ironically, such models often (by assumption) rule out quitting to employment in order to concentrate on other incentive effects, but employer-to-employer flows are the most natural "punishment" a firm faces for any loss of reputation among its existing work force.

Although most researchers recognize that employer-to-employer flows (henceforth "EE" flows) in the United States are large, previous estimates of these flows have been derived either indirectly, at low frequencies, or from data that are not representative of the nation in terms of industry, age, geography, and so on. In short, despite the importance of EE flows to our understanding of labor market and business cycle dynamics, until now the literature has lacked a comprehensive and representative measure of the size and character of these flows.[5]

In this paper, we provide the first reliable measures of EE flows for the United States, by exploiting the "dependent interviewing" techniques used in the Current Population Survey (CPS) since 1994. We find that an average of 2.6 percent of employed persons change employers each month — a higher fraction than has been sometimes used in calibration exercises.[6] Indeed, the number of persons who change employers from one month to the next is about the same as the number who move from employment to out of the labor force and more than twice the number who move from employment to unemployment. Similarly, on-the-job search appears to be an important element in hiring: Nearly two-fifths of new jobs started between 1994 and 2003 represented employer changes, a much higher proportion than the estimates used in, for example, Blanchard and Diamond (1989) or Pissarides (1994).

In addition, attempts to reconcile business cycle models with the patterns of gross flows among labor market states and with the patterns of job creation and job destruction have concluded that large and highly procyclical EE flows are essential to explaining the observed dynamics of the labor market (Burgess 1994, Mortensen 1994, Albaek and Sorensen 1998). We do, indeed, find marked procyclicality, but it is concentrated around the recession. That is, EE flows did not increase as the labor market tightened between 1994 and 2000, but they did drop sharply as the labor market loosened in 2001-2003.[7] Unfortunately, because business cycle

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[5]In contrast, analysts (most prominently, Davis, Haltiwanger, and Schuh 1996) have devoted considerable effort to measuring flows of jobs between firms. However, as emphasized by Lane, Stevens and Burgess (1996), job flows and worker flows are not synonymous, either conceptually or empirically.

[6]For example, Mortensen (1994) uses a value of 1.55 percent per quarter.

[7]Because our data do not begin until 1994, and because as of this writing the recovery does not appear to have spread to the labor market, we do not observe the labor market in a

models typically concentrate on the differences between contractions and expansions (which are generally characterized by net job losses and net job gains, respectively), and have little to say about how flows should vary as the economy heats up within an expansion, the way in which this pattern should be interpreted in terms of the theoretical literature is not clear . We view the uneven cyclical pattern of EE flows as a characteristic to be incorporated into future models.

The paper proceeds as follows: In section 2, we review previous attempts to measure EE flows, and discuss alternative data sources. In section 3, we describe how we use the redesigned CPS to measure EE transitions. In section 4, we present a complete picture of gross worker flows, summarizing the size and demographic variation in EE flows. In section 5, we examine the relationship between on-the-job search and EE flows. In section 6, we describe the cyclical behavior of gross flows. Section 7 concludes, and is followed by an appendix describing the data in greater detail.

2. Previous Estimates and Alternative Sources of Data[8]

Estimates of the extent and character of EE flows in the United States have been difficult to come by. Because convenient and representative data have been lamentably scant until recently, those few studies that have attempted to estimate EE transition rates have been limited to using unrepresentative data, low-frequency data or data from which only rough inferences can be drawn.[9] In this paper, we use data from the CPS to supply reliable and representative estimates of EE flows. In this section, we review other possible sources of data on EE flows.

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recovery phase and so cannot examine the presumption that EE flows increase sharply during that phase of the cycle.

[8]The papers cited in this section are meant to represent the available sources of data; they are far from an exhaustive selection of the studies that have attempted to estimate transition rates of various sorts, retention rates, tenure distributions, and the like.

[9]For overviews of data sources, see Farber (1999) and Davis and Haltiwanger (1999a). For descriptions of some available sources of data for Europe, see Bender and others (forthcoming), Booth (1999), Burda and Wyplosz (1994), Galizzi and Lang (1998), Gregg and Wadsworth (1995), van Ours (1995); Jackman and others (1989); for Canada, see Christofides and McKenna (1996); for Japan, see Hashimoto and Raisian (1985).

Blanchard and Diamond (1989) attempted to estimate EE flows by combining rough estimates of the quit rate in manufacturing with estimates of the fraction of quits that are followed by an EE flow.[10] However, both components of this calculation came from intermittent data sources that were not representative of the population. In addition, of course, quits are not the only source of EE flows.

Blanchard and Diamond (1990) used the annual demographic supplement to the March CPS to estimate EE flow rates. The March CPS provides information on the number of different employers (up to three) that a person worked for during the previous year and on the number of spells of unemployment (up to three) during the previous year. With these data, Blanchard and Diamond constructed upper- and lower-bound estimates of EE flows, for men only, at the annual frequency. Unfortunately, this information is not much to go on, and the range between their upper and lower bounds, as a fraction of employment, is about 10 percentage points.[11]

Several studies have used the National Longitudinal Survey of Youth (NLSY) or the National Longitudinal Survey of Young Men (NLSYM) to measure some components of EE flows.[12] These sources are limited to younger workers, at least to date (even in 2000, the oldest workers in the NLSY were only forty-two, and the oldest persons in the NLSYM were only thirty-eight when the survey ended). Also, each source is limited to a single cohort, so that at no time can they provide a representative picture of the working population.

Ruhm (1990) used the Social Security Administration's Retirement History Longitudinal Survey to calculate EE transitions for persons who retire from their "career" jobs.

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[10] Blanchard and Diamond assumed that the quit rate in the manufacturing sector published by the Bureau of Labor Statistics (BLS) through 1981 was valid for the entire economy, an assumption that has not withstood scrutiny. They drew estimates on the fraction of quits from Akerlof, Rose, and Yellen (1988), who drew, in turn, from Bancroft and Garfinkle (1963); they also used their own tabulations from the National Longitudinal Survey of Mature Men. See also Matilla (1974), Marston (1976), and Fallick (1996) for estimates of EE flows following quits.

[11] Blanchard and Diamond present their EE estimates only graphically, but it appears that their preferred estimates appear to average about 12 percent of employment each year. See also Stewart (1999).

[12] See, for example, Parsons (1991), Farber (1994), Monks and Pizer (1998), Royalty (1998), Bernhardt and others (1999), and Farber (1999).

These data could be used to calculate more general EE flows, but only for persons over age fifty-seven.

Numerous researchers have calculated rates at which workers separate from firms, or the related rates of retention or distributions of tenure, without particular regard to whether those separations are followed closely by employment with another employer. Ureta (1992) and Neumark, Polsky and Hansesn (1999), among others, have used the occasional tenure supplements to the CPS (administered in 1963, 1967, 1969, 1975, 1979, 1983, 1987, 1991, 1996, and 1998) to look at job stability. Using either constructed synthetic cohorts across surveys, or the information about different age groups in each cross-sections, these authors estimated survival rates with an employer. However, these data do not allow one to distinguish between transitions to another employer and transitions to nonemployment.

Several of the data sources that have been used to calculate survival or separation rates – including the Panel Study of Income Dynamics (PSID) and administrative records from the states' unemployment insurance systems – can be used to estimate EE flows. Each has of these data sources has own advantages and disadvantages. The PSID provides sufficient information to calculate EE flows at the annual, if not higher, frequency, and to link these flows to a rich set of information about the workers involved, including their employment histories. Unfortunately, the PSID asks the necessary questions only about heads of households and their spouses, which leaves out large numbers of younger people, among whom EE flows are especially common. Moreover, estimation of flows at higher than annual frequencies is problematic (Polsky 1999; Gottschalk and Maloney 1985).

Perhaps the most attractive alternative survey of households for this purpose is the Survey of Income and Program Participation (SIPP). Each wave of the SIPP covers a four-month period and provides information on which weeks a person was employed, was unemployed, or neither, the number of employers (up to three) and beginning and ending dates for up to two employers. In addition, the survey assigns employer identification numbers to up to two employers in each wave, and these numbers will remain the same if a person has the same employer in a subsequent wave. From this information, one can estimate monthly EE rates, and these flows can be linked to (short) longitudinal information about the workers and to

information on the reason for the transition (Bansak and Raphael 1998; Gottschalk and Moffitt 1999).

Administrative data from the unemployment insurance systems of various states allow one to follow workers across employers at the quarterly frequency -- as long as they remain within the state.[13] Several researchers have assembled data for a handful of states (Anderson and Meyer 1994; Burgess, Lane, and Stevens 2000).[14] More recently, the Census Bureau's Longitudinal Employer-Household Dynamics program is assembling such data for the nation as a whole that are not limited to in-state moves.[15] Similar, but older, data can be found in the Longitudinal Employee-Employer Data File, which contains quarterly Social Security earnings records for a large sample of persons from 1957 to 1972 (Topel and Ward 1992).

3. Employer-to-Employer Changes and Gross Flows in the CPS Data

The magnitude of worker flows across the labor market states of employment, unemployment, and not-in-the-labor-force swamps the net flows between these states. Marston (1976), most notably, used this fact about the gross flows to overturn the conventional wisdom that the U.S. labor market was inflexible, as had been suggested by the size of the net flows and the long average duration of spells of unemployment. But, as described above, although much is known about the flows across labor market states, little is known about the movement of workers from one employer to another. To remedy this deficiency, we use matched data from the basic monthly CPS covering the period from January 1994 to December 2003 to measure EE flows and other gross flows among labor market states.[16]

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[13]Of course, as we discuss below, this type of attrition is potentially more severe in the CPS.

[14]The estimates presented by Anderson and Meyer imply that EE flows amount to about 10 percent of employment each quarter.

[15] See Golan, Lane, and McEntfarfer (2004). As of this writing, these data cover more than twenty states and counting.

[16]We adopt the following dating convention: We refer to a flow from month 1 to month 2 as a month 1 flow (for example, a flow from January to February is a January flow). Accordingly, we use monthly CPS data for December 2003 and January 2004 to measure the

With the redesign of the CPS in January 1994, the Census Bureau began using dependent interviewing techniques. Rather than asking all respondents every question afresh in each month – which was a substantial burden on respondents as well as an important source of measurement errors – interviewers now ask some questions that refer back to the answers given in the previous month. In particular, if a person is reported to be employed in one month and was reported to be employed in the previous month's survey as well, the interviewer asks the respondent whether the person still works for the same employer as reported in the previous month, reading out the employer's name from the previous month. If the answer is yes, then the interviewer carries forward the industry data from the previous month's survey; if the answer is no, then the respondent is asked the full series of questions about industry, class, and occupation.[17] We exploit this dependent interviewing in the redesigned CPS to characterize workers employed in two consecutive months as employer stayers or employer changers and to construct a reliable estimate of EE flows.

In practice, a price one pays for frequent surveys is the need to rotate the sample to reduce the burden on respondents. As a result we can construct only a short panel with the matched CPS data: We can follow each individual for at most four consecutive months. This limitation does not diminish the usefulness of these data for measuring gross flows in the aggregate, but it does reduce our ability to control for heterogeneity that may influence individuals' transition rates. However, we can link data from the first through fourth interviews with those from the fifth through eighth interviews in order to partially control for unobserved individual characteristics, and we can link our matched individuals to their information collected in the periodic supplements to the CPS, such as the March annual demographic supplements and the tenure supplements. We will pursue both these avenues in future work.

Although no source of data is superior to all others in all dimensions, we believe that the redesigned CPS is the best source of data on EE transitions, and that it has several important advantages over possible alternative sources of data. First, the CPS is representative of the entire

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December 2003 flows.

[17]Respondents who report no change in employer are asked whether their job duties remained the same as in the previous month.

civilian noninstitutional population in terms of age, geography, industry, and other demographics. As discussed above, most previous estimates of EE flows in the United States have been limited by the unrepresentativeness of age or geography of the sample, or they have referred only to manufacturing. Second, the CPS data are the source of the official measures of unemployment and labor force participation; thus, our operational definitions of the gross flows correspond to the familiar concepts of employment, unemployment, and not in the labor force prevalent in the literature. Similarly, CPS data are the source of the standard estimates of the flows across these labor market states. Third, the CPS questionnaire goes into considerable detail, with careful probing, to accurately determine each individual's labor market status. Fourth, the size of the sample in the CPS is considerably larger than in other household-based surveys, which allows for more detailed analyses. Fifth, the CPS survey is administered monthly, and asks about labor market experience in the previous week. This information should be easier to recall than information about the previous calendar year (as in the PSID or NLSY) or even about the previous four months (as in the SIPP).[18] Finally, the CPS measures of all types of EE flows, whether initiated by a quit or a discharge.

Of course, our measure of EE transitions is not perfect. One deficiency that it shares with almost all attempts to measure transitions is that it may include as a single EE transition an employer change that involved an intervening period of nonemployment or multiple employers between survey dates. Respondents are interviewed during the week that includes the 19th of each month about their labor market activities during the week including the 12th of the month.[19] Because of the gap between surveys, some workers who are employed during the reference periods in two successive months may have experienced some period of nonemployment between the reference weeks. We have no way of quantifying this effect, so we classify all workers who report different employers in the two months as employer changers. Of course, the possibility that an individual changed employers several times between reference weeks – with

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[18]In a related vein, because the CPS data become available within a couple of months of the survey, they allow for timely updates of the flows.

[19]This scheduled changes in December, when both the reference week and the survey week are one week earlier.

or without intervening periods of nonemployment – makes signing, let alone estimating, the bias in our estimates of EE rates difficult, but at the monthly frequency of the CPS we do not regard this problem as serious.[20] In quarterly data, such as that drawn from unemployment insurance or Social Security records, this problem is potentially much more severe: A person employed by one employer in one quarter and a different employer the following quarter may have experienced a long period of nonemployment between observations.

Sample attrition is a potentially more serious issue. This problem, as well as other issues related to matching CPS files, are discussed in the appendix.

4. The Complete Picture of Gross Labor Market Flows

Several researchers have examined gross worker flows between employment (E), unemployment (U), and not in the labor force (N).[21] Table 1 presents our estimates of these flows as a percentage of the population for the years 1994 and 1996-2003.[22] In the table, first-month labor force status is shown along the vertical axis and second month labor force status is shown along the horizontal axis. Each box represents a flow from the first month to the second

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[20]In addition, our month-to-month measure of EE flows does not account for workers who may return to a previous employer after a short temporary separation. Also, we define employer-changing with respect to a person's main job; a person holding multiple jobs simultaneously may be recorded as having changed employers if he separates from his or her main employer but remains employed at his or her second job.

[21]For example, Bleakely, Ferris and Fuhrer (1999), Blanchard and Diamond (1990), Poterba and Summers (1986), and Davis and Haltiwanger (1999a).

[22]These tabulations, and those that follow in the rest of this section, exclude data from the year 1995, for which we do not have data for all twelve months. (The Census Bureau changed its household identification methodology between June 1995 and August 1995 and prevented matches during these months for fear that respondents' confidentiality could be breached.) Because of the strong seasonal component to the EE and other flows, we eliminated the entire calendar year from our basic sample out of concern that using only some months during a year might bias the estimates of gross flows.
    We found that rotation groups one and five had higher rates of EE changing and flows out of employment. Given that this is consistent with the well-documented "rotation group bias" in the CPS, we have decided to feature results that exclude these rotation groups. We discuss the rotation group bias more completely in the appendix, where we also report results including the first and fifth months groups.

month. The diagonal represents individuals who remain in the same state in both months. Roughly 2.5 percent of the relevant population – The civilian noninstitutional population aged 16 and over – moved from employment to nonemployment (that is, unemployment plus not in the labor force) in an average month, and a slightly higher number moved from nonemployment to employment.[23]

These figures are large. In 1999, to take just one year, average flows out of employment amounted to about 5 million workers per month, compared with average net employment growth of "only" 120,000 per month. However, these numbers understate the full extent of worker mobility because they exclude information on EE transitions.

Table 1			
Gross flows among labor market states, 1994 and 1996-2003			
(percent of population, monthly)			
State in first month	State in second month		
	Employed	Unemployed	NLF
Employed	60.6	0.8	1.7
Unemployed	1.0	1.7	0.8
Not in labor force (NLF)	1.6	0.8	31.0

We extend the standard analysis of gross labor market flows to include EE flows in table 2. If employed in the first month, a worker can be in one of four states in the second month: employed with the same employer (an employer stayer), employed with a new employer (an employer changer), unemployed, or not in the labor force. Likewise, if employed in the second

[23]In addition to allowing one to measure EE transitions, the redesigned CPS goes into greater detail to establish each individual's correct labor market status. The increased probing has produced smaller--and presumably better--estimates of gross flow rates across labor market states. Indeed, Bleakley, Ferris, and Fuhrer (1999) provide time series plots of the gross flow rates over the period from January 1976 to March 1999; these plots show a notable drop-off beginning in 1994 – even as compared with pre-1994 flow rates adjusted using the Abowd-Zellner (1985) factors.

month, a worker could have been in one of four states in the first month: employed with the same employer, employed with a different employer, unemployed, or not in the labor force. To accommodate the added state, "still employed/new employer," we added a column to the table. Adding the EE flows increases the number of separations (the sum of the flows from employment to nonemployment and from one employer to another) and the number of accessions (the sum of the flows from nonemployment to employment and from one employer to another) by more than half.

Table 2				
Gross flows among labor market states with EE flows, 1994 and 1996-2003				
(percent of population and percent of state in first month, monthly)				
State in first month	State in Second Month			
	Same Employer	New Employer	Unemployed	NLF
As a percent of population				
Employed	59.0	1.6	0.8	1.7
Unemployed	--	1.0	1.7	0.8
NLF	--	1.6	0.8	31.0
As a percent of state in first month				
Employed	93.4	2.6	1.3	2.7
Unemployed	--	28.3	48.4	23.3
NLF	--	4.8	2.4	92.8

All in all, 6.6 percent of all employee-employer matches ("jobs") were dissolved in an average month, and 6.6 percent of all matches in an average month were new, compared with average published net employment growth in the CPS of only 0.1 percent per month in these years. On average, 2.6 percent of employed workers leave one employer for another each month – about two-fifths of the total number of employer separations. This flow is about the same size

as the EN flow and double the EU flow.[24] Similarly, about two-fifths of the workers acceding to a new employers did so straight from a previous employer. Clearly, excluding EE transitions from an analysis of gross labor market flows misses a large part of the mobility in the US labor market.

Group Differences in Gross Flows

A well-known feature of the labor market is that the frequency of labor force transitions varies greatly over the life cycle and across demographic groups. We find that EE flows vary considerably less than do other flows. As a result, overall turnover differs less across groups once one accounts for EE movements.

As shown in figure 1, the monthly separation rate (separations as a percent of employment) falls through about age forty, as workers settle into jobs, and begins to rise as retirement becomes more common near to age sixty. Similarly, the percentage of employment at each age that represents new accessions falls sharply through the mid-twenties and begins to rise as retirements increase. However, the degree of churning – job-shopping and the like – is best represented by the EE rates shown in the top panel of the figure. Although researchers have repeatedly demonstrated that the rate of EE movement declines sharply through about age thirty, less well known is that the EE rate shows little change from about age forty on.[25] Thus, the contribution of workers in the youngest two age groups to the total number of EE transitions is about twice their share of employment. As shown in table 3, the contributions to EE flows of workers at or above middle age is fairly stable at about two-thirds, although the relative contribution to separations and accessions rises with age.

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[24]This flow is about four times as large as estimated in Blanchard and Diamond (1989), somewhat smaller than would be consistent with the 10 percent of employment per quarter estimated by Anderson and Meyer (1994), and consistent with the wide range of estimates provided by Blanchard and Diamond (1990).

[25]Overall rates of separation and accession for young men differ little from those for young, although young men are more likely to move to make EE or EU transitions and are less likely to make EN transitions. Royalty (1998) finds similar differences between the turnover patterns of men and women in the NLSY.

Moreover, even at younger ages, EE flows decline with age more slowly than do other forms of separation. Because EE flows vary less with age than do other labor market transitions, the bulk of the age differences in measures of job stability based on separation rates (for example, Jaeger and Stevens 1999; Neumark, Polsky and Hansen 1999) stem from departures to nonemployment rather than employer changes. That is, including EE flows mitigates differences in turnover rates by age.

Table 3
Contributions to monthly employment transitions by age
(percent)

Age	Employment	Separations (EE+EU+EN)	EE	Accessions (EE+UE+NE)
16-19	5.1	15.6	11.1	16.7
20-24	9.4	16.5	17.5	16.9
25-34	23.1	21.3	25.2	21.5
35-44	27.2	19.1	21.9	19.2
45-54	21.8	13.6	15.0	13.8
55-64	10.4	8.6	7.3	7.8
65 and over	3.1	5.3	2.1	4.8
Total	100	100	100	100

Note. Flows are abbreviated as follows: EE employer-to-employer; EU employment to unemployment; EN employment to not in the labor force; UE unemployment to employment; NE not in the labor force to employment. Components may not sum to totals because of rounding.

In a similar fashion, EE flows reduce the differences in separation and accessions rates between men and women. Women separate from their employers more often overall (due largely to higher rates of leaving the labor force) but move from one employer to another a bit less often than do men. Table 4 summarizes flows for these and other demographic breakdowns. Nonwhite workers separate from their employers at higher rates than do whites, but the two groups have similar EE rates. Both total separation rates and EE transition rates fall as education levels rise, but EE rates fall much more slowly.

Table 4
Employment transitions by demographic characteristics
(percent of employment, monthly)

Characteristic		Separations (EE+EU+EN)	EE	Accessions (EE+UE+NE)
Age	16-24	14.6	5.1	15.3
	25-54	4.9	2.2	5.0
	55 and over	6.9	1.8	6.3
Sex	Female	7.0	2.5	7.1
	Male	6.3	2.7	6.2
Race	Nonwhite	7.7	2.6	7.8
	White	6.4	2.6	6.5
Education	< high school	12.0	3.4	12.5
	High school	6.6	2.6	6.5
	Some college	6.4	2.7	6.5
	College	4.6	2.3	4.6
	> college	3.9	2.0	3.9

Note. Flows are abbreviated as follows: EE employer-to-employer; EU employment to unemployment; EN employment to not in the labor force; UE unemployment to employment; NE not in the labor force to employment.

Table 5 summarizes flows for different breakdowns of job characteristics. Full-time workers (those reporting that they usually worked thirty-five or more hours on their main job) show greater job stability than do part-time workers, but, as is the case for education, the EE rates differ considerably less than do the rates of other types of separations. In keeping with conventional wisdom, government workers are less likely to separate from their employers than are workers in the private sector; this finding includes lower EE rates. In the private sector, self-employed workers have similar separation rates and slightly lower EE rates than do those who

work for someone else.[26] Although most of the self-employed workers who report an EE transition move out of self-employment, a significant number remain self-employed, in which case the economic meaning of the transition is less clear. Within the private sector, the industries with particularly high EE rates are agriculture, construction, retail trade, and private household services.

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[26]For our purposes, we group the incorporated and the unincorporated self-employed together. In contrast, the official statistics from the BLS include the incorporated self-employed in private wage and salary workers.

Table 5 — Employment transitions by job characteristics (percent of employment, monthly)				
Characteristic		Separations (EE+EU+EN)	EE	Accessions (EE+UE+NE)
Work schedule	Part-time	13.0	4.0	13.6
	Full-time	4.7	2.2	4.6
Class	Government	4.3	1.6	4.4
	Private employees	7.0	2.8	7.1
	Self-employed	7.1	2.4	6.8
Industry	Agriculture, etc.	11.4	3.4	11.1
	Mining	4.7	2.3	4.5
	Construction	8.8	3.4	8.8
	Manufacturing	4.8	1.9	4.7
	Trans, comm, util	4.7	2.0	4.8
	Wholesale trade	5.6	2.4	5.7
	Retail trade	8.6	3.4	8.7
	Fin, ins, real est	5.6	2.4	5.7
	Private households	13.9	3.6	13.8
	Other services	6.6	2.7	6.8

Note. Flows are abbreviated as follows: EE employer-to-employer; EU employment to unemployment; EN employment to not in the labor force; UE unemployment to employment; NE not in the labor force to employment.

5. On-the-Job Search

Lacking direct measures of EE flows, some researchers have estimated such flows as the fraction of workers who quit from employment after having already lined up another job.[27] However, defining EE flows as resulting only from quits, and especially from quits that follow on-the-job search, will underestimate the extent of EE flows. We find that only about one-fifth of EE changers engaged in active on-the-job search in the three months before the move, a smaller fraction than -- but still not too different from -- the approximately one-third of newly employed workers who were unemployed (that is, actively searching) in the previous month.

We construct a dataset that includes information on both on-the-job search and labor market flows by linking our monthly matched CPS data with information on the job-search behavior of employed workers collected in the contingent worker supplements to the February 1997 and February 1999 CPS.[28] For workers employed more than three months, the survey supplement asks (in mid-February), "Since the beginning of December, have you looked for other employment?" For workers employed at most three months with their current employer, the survey asks "Since you started working for [fill: employer's name from basic CPS], have you looked for other employment?" The supplement differentiates between active and passive methods of search, using the same definitions as the basic CPS uses in determining whether an individual is unemployed.[29] The survey also differentiates between those looking for a new job and those looking for an additional job. By analogy with the CPS definition of unemployment (excluding those on temporary layoff), we define as on-the-job-searchers as only those workers actively looking for a new job.

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[27]See, for example, Mattila (1974), Tobin (1972), and Blanchard and Diamond (1989).

[28]See Meisenheimer and Ilg (2000) for a more complete description of the survey questions and for descriptive statistics on the extent of on-the-job search; these authors do not address the outcomes of on-the-job search.

[29]Specifically, the supplement asks, "What are all of the things you have done to find other employment ... ?" Active search includes contacting an employer directly; contacting a public or private employment agency; contacting friends or relatives; contacting a school employment center; sending out resumes or filling out applications; checking union or professional registers; or placing or answering a want advertisement. Passive search includes looking at advertisements or attending a job training course.

Table 6 reports on the March labor force status of individuals employed in February 1997 and February 1999, differentiated by on-the-job search behavior. Of those employed in February, 4.4 percent had engaged in active on-the-job search. These job-seekers were much more likely to have changed employers between February and March: The proportion of on-the-job searchers who reported a new employer in March was 11.3, compared with only 2.1 percent of nonsearchers. Searchers were also more likely to have become unemployed in March -- when they presumably continued their search for a new job – than were nonsearchers (5.6 percent vs. 0.9 percent). However, searchers were no less likely than were nonsearchers to leave the labor force.

Table 6 Flow rates for employed workers in February 1997 and February 1999 by on-the-job search behavior (percent of searchers or nonsearchers, monthly)				
Search behavior (Percent of employment)	Employed		Unemployed	NLF
	Same employer	New employer		
No on-the-job search (95.6%)	95.0	2.1	0.9	2.0
On-the-job search (4.4%)	80.9	11.3	5.6	2.3

Table 7 reports the importance of on-the-job search in overall labor market flows. It is analogous to table 2, except that in table 7 we divide employed workers into on-the-job searchers and nonsearchers, we distinguish between unemployed workers who are on temporary layoff and those who are not, and we report only on the flows between February and March of 1997 and 1999.[30] As shown in the table, on-the-job search between the beginning of December and mid-

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[30]Not all individuals employed in February 1997 and February 1999 had valid responses to the supplement questions. There are small differences in composition between the full sample of February-March matches and that restricted to valid supplement responses in February; in particular, the supplement reports that 2.5 percent of employed workers in February held a different job at the March reference period compared with a 2.6 percent EE rate for the broader sample. We calculated the rates in table 7 by multiplying each of the overall flow rates based on

February (or since the job held in February began--whichever period is shorter) was associated with about 20 percent of all EE changers; thus, 80 percent of the EE changers between February and March did not engage in any active on-the-job search, at least through the February reference week.

Table 7 Gross worker flows by on-the-job search behavior (percent of population, monthly)				
Search behavior	Employer stayer (or employed)	New employer	Unemployed	NLF
Employed	59.2	1.6	0.7	1.4
On-the-job search	2.2	0.3	0.2	0.1
No on-the-job search	57.0	1.3	0.5	1.4
Unemployed (not on temporary layoff)	0.7	--	1.4	0.7
Unemployed (on temporary layoff)	0.3	--	0.3	0.1
NLF	1.5	--	0.8	31.3

On its face, the relatively small share of EE flows explained by on-the-job search may seem odd. However, although EE changers who engaged in on-the-job search were in the minority, the same was true of workers who were newly employed in March and had reported that they were actively searching for a job (that is, unemployed) at the time of the February survey. Only about one-third of the movers from non-employment (excluding those on temporary layoff) to employment reported themselves as unemployed (that is, actively searching) in February. Thus, the contribution of on-the-job search in explaining flows from other employers into new employers, and the contribution of off-the-job search in explaining flows into new employers from nonemployment, appear to be of similar importance.

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the full February-March matches by the share of the appropriate group that engaged in on-the-job search in the February supplements.

Moreover, we have reason to believe that our estimate understates the share of EE changers who had looked for a new job while employed. First, because our measure of on-the-job search captures search only before the first month of each matched observation, we do not pick up any job-seeking behavior between the February and March reference weeks. Second, many EE changes involve geographic moves; because the CPS is an address-based survey, a person who moves out of an address to be closer to a new job will not be counted as a job changer in our sample.[31]

6. The Cyclical Properties of Gross Flows

Until now, the business cycle literature has lacked a reliable and representative measure of the frequency of EE flows to which models may be calibrated and with which their simulation results may be compared. In section 3, we provided such a measure of the level of EE flows and found that level to be higher than the indirect measures typically used in the literature. In this section, we examine another aspect of EE flows often used in modeling exercises: how EE flows change with the business cycle.

The literature on worker flows has tended to define the cyclicality of flows by their correlations with the *level* of economic activity, as measured by the unemployment rate (e.g., Blanchard and Diamond 1990; Mortensen 1994; Merz 1999), the level of employment (e.g., Albaek and Sorensen 1998; Cole and Rogerson 1999), or the level of capital utilization (e.g., Burda and Wyplosz 1994). Because we use the level of the unemployment rate as a measure of the cycle, we compare stylized facts about the change in gross flow rates over the business cycle to changes in the unemployment rate.[32]

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[31]In addition, contacts initiated by another employer may not be classified as on-the-job search in our data, and seasonal jobs that had been lined up well in advance of the start date would not be counted in these data as involving search. Note that these reasons may also apply to the share of the nonemployed who report active search, that is, to the unemployed.

[32]An alternative conception would define the cyclicality of flows by their correlation with the *growth* in activity, that is, with the (detrended) growth in employment or with the change in the unemployment rate, rather than with their levels. The choice largely reflects differences in the question of interest. In an algebraic sense, the steady-state level of flows determines the steady-state level of the unemployment rate, and when not at the steady-state rate of

The literature has established several facts about the behavior of gross flows of workers across labor market states over the business cycle.[33] Several of these empirical regularities are as follows, where flows are viewed as a percentage of the population, rather than as hazard or transition rates:

1.   The flow into unemployment is countercyclical.

2.   The flow out of unemployment is countercyclical.[34]

3.   The cyclicality of the flow into employment is unclear; it combines a countercyclical flow from unemployment to employment with a procyclical flow from not in the labor force to employment.

4.   The flow out of employment is probably countercyclical in the United States, but if so only weakly; in Europe it appears to be procyclical.

The literature has concluded that reconciling these flows with the stylized facts about job creation and job destruction requires that EE flows be large and highly procyclical. Accordingly, Pissarides (1994), Petrongolo and Pissarides (2001), and others have pursued model-building strategies that aim to accommodate these two properties.[35]

Of these two requirements, the first is satisfied: We have shown above that EE flows are, indeed, large. The question of cyclicality is more difficult because our sample period is short. But we do have data for a period of strong expansion during which the labor market tightened

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unemployment, the level of flows determines the change in the unemployment rate. From the perspective of search and matching models, however, the interesting question is how the level of worker flows react to the elements of the Beveridge Curve, and thus to the level of the unemployment rate.

[33]See, for example, Blanchard and Diamond (1990), Burda and Wyplosz (1994), Mortensen (1994), and Merz (1999).

[34]The hazard rate for leaving unemployment is procyclical, but the countercylicality of the size of the pool of unemployed is the dominant factor.

[35]For example, Pissarides (1994) and Petrongolo and Pissarides (2001).

markedly (the years 1994-2000), for the recession year of 2001, and for two years of further deterioration or stagnation in the labor market (2002 and 2003).[36]

We begin by showing that over our sample period, during which the annual unemployment rate decreased a bit more than 2 percentage points (from 6.1 percent to 4.0 percent) and then rose by a similar amount (back up to 6 percent), the flows across labor market states other than the EE flow have moved in accordance with the stylized facts concerning their cyclicality; from this result we conclude that our sample period is informative about cyclical properties and therefore can be used to inform us about the cyclical behavior of EE flows as well.

Figure 2 shows the pattern of the flows into and out of the labor market states of unemployment, employment, and not in the labor force in our data during the years 1994-2003.[37] (Note that the range of the vertical axis in each panel is the same, although the endpoints naturally differ).

1. Shown in the top left panel, the flow into unemployment is countercyclical.

2. In the top right panel, the flow out of unemployment is countercyclical.

3. The flow into employment in the middle left panel follows no clear cyclical pattern, and varies less than do the flows in the top panels. Its components are shown in the top panels of figure 3: The flow from unemployment to employment is roughly countercyclical and the flow from not in the labor force to employment is roughly procyclical.

4. The flow out of employment is at best only weakly countercyclical in the literature. In our data, this flow declines for the first couple of years of our sample before increasing as the expansion continued, and then spikes in the

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[36]The National Bureau of Economic Research dated the peak of the expansion in March 2001 and the trough in November 2001.

[37] Because not all months in 1995 are represented in our matched data, we regress the monthly flow rates on month and year dummies, and report the coefficients on the year dummies with the mean of the coefficients on the month dummies added back in. The conclusions here would not change if instead we drew our annual averages from an X-12 seasonal adjustment procedure.

recession year of 2001 before falling again. As shown in the middle and bottom left panels of figure 3, this ambiguous result is a combination of a roughly countercyclical EU flow and a roughly procyclical EN flow.

Because our data cover only ten years and one recession, we take advantage of an additional source of business cycle variation to verify the cyclical patterns of the gross flows in our sample: the substantial differences across states in the degree and timing of labor market tightening. For example, the declines in published unemployment rates between the beginning of our sample in 1994 and the last year of general expansion in 2000 ranged from more than 3-1/2 percentage points in Maine and California to about 1 percentage point in Wisconsin and Mississippi to essentially zero in Montana and Nebraska; and the change from 2001 to 2003 ranged from increases of 2-1/4 percentage points in Colorado and Connecticut to small declines in Nevada and Hawaii.

Table 8 reports estimated coefficients from regressions of the state-level flows on the unemployment rate, with state fixed-effects removed, for the period 1994 to 2000 (that is, only the years of a tightening labor market), and the period 2001-2003 (that is, only the years of a loosening labor market). The state-level results generally accord well with the stylized facts, confirming the impressions from figure 2.

1. The state-level estimates in column 1 indicates that the flow into unemployment is strongly countercyclical.

2. Similarly, column 2 indicates that the flow out of unemployment is strongly countercyclical.

3. In column 3, the cyclicality of the flow into employment is not clear.

4. In column 4, the flow out of employment appears to be acyclical, as in the aggregate data, in the earlier period, but procyclical (as in the literature on Europe) in the later period. In fact, as shown in table 9, the EN flow is countercyclical in both periods; the change in the cyclicality of the total flow out of employment occurs between the two periods appears because the EU flow loses its procyclicality in the later period.

Table 8
Regression estimates of state-level monthly flows on the unemployment rate, fixed effects removed, 1994, 1996-2000, and 2001-2003

Unemployment rate	Flows			
	Into unemployment	Out of unemployment	Into employment	Out of employment
1994, 1996-2000				
Coefficient	0.20	0.21	0.02	0.00
Standard error	(0.01)	(0.01)	(0.01)	(0.01)
2001-2003				
Coefficient	0.12	0.17	-0.03	-0.10
Standard error	(0.02)	(0.02)	(0.02)	(0.03)

Several authors have argued that when these facts about gross flows of workers are combined with the stylized facts concerning job creation and job destruction, paradoxes arise that can be resolved most naturally by procyclical EE flows. For example, Mortensen (1994) argues that in the absence of procyclical EE flows, the procyclicality of job creation is difficult to reconcile with the absence of procyclical flows into employment.[38] Similarly, Albaek and Sorensen (1998) observe that without procyclical EE flows, the strong countercylicality of job destruction is difficult to reconcile with the weak countercyclicality of flows out of employment.

Our data indicate that EE flows are indeed procyclical, but not uniformly over the phases of the cycle. The EE flows in figure 4 exhibit no obvious cyclical pattern between 1994 and 2000, falling initially as the labor market tightened, and then rising again more recently. However, EE flows fell sharply in 2001 and again in 2002 and 2003 as the labor market weakened further (as measured by the unemployment rate).

Again, we turned to state data to support the findings from the aggregate flows. As with the aggregate data, the state-level variation in EE flows between 1994 and 2000 does not provide

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[38]In addition, Burgess (1993) argues that the procyclicality of accessions and the acyclicality of flows out of unemployment in the United Kingdom imply procyclical EE flows.

any evidence of procyclicality. Table 9 reports estimated coefficients from regressions of the state-level flows on the unemployment rate with state fixed-effects removed; these coefficients are are analogous to those reported in table 8. As shown in the first column, when only these expansion years are included, a 1 percentage point increase in a state's unemployment rate is associated with essentially no change in the EE flow rate (as a percentage of the population), and the coefficient is not statistically significant.[39] However, during the weak labor market years of 2001-2003, the coefficient on the unemployment rate in the EE regression becomes significantly negative, suggesting that the procyclicality of EE flows is concentrated around recessions.

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[39]As with the aggregate data, the regression results for the other flows at the state level match up well with the stylized facts. The second and third columns of table 9 show the coefficients from regressions of the EU flow rate and the UE flow rate, respectively. As expected, both flows are strongly countercyclical, with a 1 percentage point increase in the unemployment rate raising the EU and UE rates by 0.08 and 0.1 percentage point, respectively. Conversely, as shown in the remaining columns, the EN and NE flow rates are procyclical, and the NU and UN flow rates are countercyclical. Of course, the same caveats apply here as to our analysis of the cyclicality of flows at the aggregate level.

Table 9

Regression estimates of state-level monthly flows on the unemployment rate, fixed effects removed, 1994, 1996-2000, and 2001-2003

Unemp. rate	Flow						
	EE	EU	UE	EN	NE	NU	UN
	1994, 1996-2000						
Coeff.	0.01	0.08	0.10	-0.07	-0.07	0.12	0.12
Std Error	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	2001-2003						
Coeff.	-0.16	0.01	0.04	-0.11	-0.08	0.11	0.12
Std Error	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)

Note. Flows are abbreviated as follows: EE, employer-to-employer; EU, employment to unemployment; EN, employment to not in the labor force; UE, unemployment to employment; NE, not in the labor force to employment; NU, not in the labor force to unemployment; UN, unemployment to not in the labor force.

To reiterate, we find no evidence that EE flows vary much with the business cycle during an expansion but find ample evidence that they fall sharply as the labor market weakens. For now, we can only speculate that EE flows will also exhibit strong procyclicality as the labor market recovers. However, we can conclude that if EE flows do exhibit the great procyclicality that the literature requires, then this procyclicality is concentrated around recessions and the early stages of recoveries; we see no evidence of consistent procyclicality during an expansion, the phase of the business cycle in which we most often find ourselves.

Unfortunately, when matching business cycle models to the empirical facts, the literature has made little attempt to distinguish between a model's implications for differences between expansions and recessions and its implications for changes within expansions or recessions, especially around cyclical turning points. Summary statistics concerning variation in flows are likely to be dominated by the contrasts between expansion and recession, so the hypotheses

generated by the literature may be more applicable to comparisons between phases of the business cycle than to comparisons within a phase. Pissarides (1994) is a notable exception.[40]

The data do bear another interpretation: The unemployment rate in 1994 averaged 6.1 percent -- about the same as the 6.0 percent average over 2003 -- yet the level of EE flows was much higher in 1994 than in 2003. Perhaps there is a secular downtrend in EE flows that obscures a procyclical pattern that is consistent throughout the business cycle. Without a longer time series, we cannot distinguish definitively between these alternative interpretations. However, the results from the state-level regressions favor the view that the cyclicality of EE flows is uneven across the business cycle.

Why is phase of cycle important for EE flows, but not for the other flows across labor force statuses? Table 10 suggests that unlike other flows, EE flows are related to the *change* rather than to the *level* of employment or labor market tightness. Although the unemployment rate fell throughout the expansion, the rate of employment growth and the EE flows were reasonably stable. And although unemployment rates in 2001-2003 did not exceed those in, say, 1994-1996, employment growth rates in the later period were much lower (and *changes* in the unemployment rate more positive) and EE flows much lower than in the earlier period.[41] Similarly, in the state regressions, the rate of EE flow was much better explained by employment growth (or the change in the unemployment rate) than by the level of the unemployment rate, while the opposite was true, overall, for the other flows.

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[40]Pissarides writes "Intuitively, when economic conditions first improve, many employed workers enter the market to look for better jobs. There is nothing to slow down this entry, so it follows immediately after the shock. As the new entrants succeed in finding jobs, and unemployment also falls in response to the better conditions, the number of workers employed in bad jobs and looking for work begins to fall. Thus [the level of EE flows] 'overshoots' on impact its steady-state level." This conjecture is consistent with the pattern we observe in our data.

[41]Although the data for 2003 fit the general pattern of low employment growth and low EE flows, that year is a bit unusual (even for this short sample) in that EE flows slowed further even as the deterioration of the labor market slowed. But, in the view of many observers, gross hiring failed to pick up in 2003 even as job losses slowed, so the level of gross activity, so to speak, in the labor market did not pick up in keeping with the improvement in employment growth.

Measure		Year									
		'94	'95	'96	'97	'98	'99	'00	'01	'02	'03
Unemployment rate		6.1	5.6	5.4	4.9	4.5	4.2	4.0	4.7	5.8	6.0
Change in unemployment rate[a]		-0.8	-0.5	-0.2	-0.5	-0.4	-0.3	-0.2	0.7	1.1	0.2
Employment growth (CES)		3.1	2.6	2.1	2.6	2.6	2.4	2.2	0.0	-1.1	-0.3
EE relative to population[b]		1.8	1.7	1.7	1.7	1.7	1.7	1.8	1.6	1.5	1.3
EE relative to employment[b]		3.0	2.8	2.6	2.7	2.6	2.7	2.8	2.5	2.4	2.2

Table 10

Measures of the business cycle and EE flows, 1994-2003

(percents)

[a]percentage points   [b]monthly

While we recognize the limitations imposed by our sample period, we maintain that our data provide the best evidence to date of the cyclical properties of EE flows.[42] These findings have important implications for the continued development of business cycle models. Researchers should pay greater attention to how the implications of such models for labor market dynamics vary according to the phase of the business cycle, and as a corollary, to the period of the data to which the models are applied.

7. Conclusion

In this study, we exploited the dependent-interviewing techniques in the redesigned Current Population Survey to estimate employer-to-employer flows over the period 1994 to 2003. We found that these flows are a large and important element of the overall mobility in the U.S. labor market; they are as large as EN flows and twice as large as EU flows. We also found tentative evidence that EE flows fall as the labor market loosens, but that they do not rise during the post-recovery expansionary phase. That is, our data suggest that the procyclicality of EE

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[42]Perhaps the most frequently cited evidence of procyclical EE flows is presented in Blanchard and Diamond (1989), who base their conclusions on the procyclicality of quit rates in manufacturing (see above). To our knowledge, ours is the first direct evidence of the cyclicality of aggregate EE flows in the United States.

flows that is not present in all phases of the business cycle, but only around recessions. Looked at another way, our data suggest that the size of EE flows seems to be related to the change in, rather than the level of, employment or the unemployment rate.

These data raise several questions that we intend to pursue in future work (beyond further study of the cyclical variation in gross flows). One such question is the role of EE flows in the sectoral reallocation of labor. This role is important for understanding both the way in which reallocation contributes to equilibrium unemployment and the relationship between reallocation and the business cycle (Lilien 1982; Fallick 1996). Our preliminary work indicates that about one-third of structural reallocation, defined as the variance in seasonally adjusted net employment growth across two-digit industries, is accomplished through EE flows. In addition, these data should prove useful in studying the determinants of job mobility and the tremendous seasonality that is characteristic of labor market flows.

Appendix: Measuring Gross Flows with CPS Data

Matching Individuals in the CPS

Each month, the CPS collects demographic and labor force data from a sample of approximately 60,000 households (50,000 between 1996 and 2000) , which yields information for about 120,000 individuals. Households are interviewed eight times over a sixteen-month period. They are interviewed for four consecutive months, not interviewed for the next eight months, and then interviewed again for another four consecutive months. The households are divided into eight approximately equal-sized groups so that in any month one-eighth of the households (referred to as a "rotation group") have been interviewed once, one-eighth have been interviewed twice, and so on. Thus, by design, about three-fourths of the households interviewed for the CPS in any one month had been interviewed in the previous month as well, and one can match the data for most of the persons in these households across the two months; the remaining one-fourth of the households are either just entering the sample or re-entering after an eight-month absence.

To match individuals' records from one month to the next, we use a matching algorithm similar to that used by the BLS in constructing gross flow figures.[43] We match individual records from one month to the next using the household identification number (ID), augmented by state of residence and serial suffix when IDs are not unique, the person's line number within the household, and the person's sex, race, and age. We require exact matches for all of the variables except age; we accept cases in which age decreased by no more than one year or increased by no more than two years. In practice, our algorithm completes about 95 percent of the potential matches.

A seemingly eligible individual may not match from one month to the next for several reasons. Among them, the household may move residence, the individual may move out of the household, the members of the household may be unavailable or unwilling to complete the CPS questionnaire, or a coding error may have occurred. Our estimates of flow rates may be biased

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[43]Bleakley, Ferris, and Fuhrer (1999) use a similar method. For an exploration of alternative criteria for matching CPS files, see Madrian and Lefgren (2000).

to the extent that matching probabilities are correlated with probabilities of leaving or entering employment.[44] We label this type of bias "attrition bias" and discuss its effects on our results below.[45]

In addition, the redesigned CPS continues to suffer from "rotation group" bias. The BLS and the Census Bureau have shown that the reported levels of both employment and unemployment may be biased upward for individuals in the first rotation group in the CPS sample.[46] As shown in table A.1, because the level of employment is overstated for individuals in the first rotation group, the employer separation rates are also biased upwards. Moreoever, the EE and EN rates are considerably higher for employed individuals in the fifth rotation group. For the main analyses of the paper, we drop the first and fifth rotation groups and report results based only on rotation groups 2, 3, 6, and 7.

Table A.1								
Employer separation rates by first month in sample, 1998								
(percent, monthly)								
Month in sample								
Flow	One	Two	Three	Five	Six	Seven	One or five	Other
EE	3.12	2.76	2.56	3.03	2.74	2.60	3.08	2.66
EU	1.35	1.28	1.25	1.25	1.21	1.26	1.30	1.25
EN	3.28	2.75	2.61	2.96	2.64	2.50	3.12	2.62

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[44]Bleakley, Ferris, and Fuhrer (1999) found that the probability of not matching was correlated with household characteristics.

[45]See Barkume and Horvath (1995) for discussion of attrition bias in computing gross flows with pre-1994 data.

[46] See U.S Department of Labor (2000, pp.10-9, 16-8 and following).

Attrition Bias

To explore the extent of attrition bias in our estimates of flow rates and the relationship between the size of the bias and individuals' characteristics, we expanded our main dataset to include nonmatches, such as those resulting from noninterviews. The first column of table A.2 reports match rates for various demographic groups for calendar year 1998, and the remaining columns report EE flow rates, EU flow rates, and EN flow rates.[47] As shown in the table, match rates are lowest for young workers and less educated workers, who also had the highest rates of EE, EU, and EN transitions. In addition, match rates are lowest for unemployed workers, a finding that may simply reflect the relatively higher unemployment rates for younger, less educated workers.

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[47]In table A.2 we report only flow rates out of employment; the effects of attrition bias on the flows into employment are similar.

Table A.2

Match rates by demographic characteristics, **month 2 to month 3**

	Match rate	EE rate	EU rate	EN rate
Male	94.9	2.74	1.33	2.11
Female	95.4	2.59	1.15	3.23
Ages 16 to 24	92.7	5.34	2.77	6.63
Ages 25 to 54	95.0	2.29	1.04	1.54
Ages 55 and above	96.9	1.79	0.74	4.30
White	95.5	2.68	1.16	2.52
Black	93.6	2.61	1.77	3.25
Less than high school	94.6	3.49	2.63	5.83
High school	95.1	2.68	1.40	2.42
Some college	95.3	2.81	1.10	2.49
College degree	95.5	2.28	0.65	1.58
Advanced degree	95.7	1.98	0.44	1.35
All (unadjusted)		2.67	1.25	2.63
All (adjusted)		2.69	1.27	2.64

One way to estimate the bias in the aggregate EE and other job separation rates induced by the correlations between matching rates and gross flow rates is to reweight the matched sample to account for the different attrition rates for different groups. We divide the observations into cells defined by age group (16-19, 20-24, 25-34, 35-44, 45-54, 55-64, and 65 plus), sex, race, educational attainment, employment status, month in sample, and calendar month, and we reweight using the inverse of the match rate for each group. Comparing the final two rows of table A.2, we find that reweighting the sample has little effect on the flow rates out of employment, raising the EE, EU, and EN transition rate only trivially. Tables A.3 and A.4 report the distribution of labor market states in the two months and the flows between them using the two sets of weights. The only notable finding is that the NE and NU flow rates are

higher with the alternative weights, a reflection of the relative shift in the weights from older individuals with a high probability of remaining in the sample to younger individuals with higher attrition weights.

		Month 2 status				
Table A.3						
Labor market status as share of population						
(alternative weights in parentheses)						
Month 1 status	Match rate	Same employer	New employer	Unemployed	Not in the labor force	Month 1 share
Employed	95.2	59.45	1.70	0.80	1.67	63.62
		(59.43)	(1.71)	(0.81)	(1.68)	(63.63)
Unemployed	91.9		0.96	1.48	0.77	3.22
			(0.97)	(1.49)	(0.77)	(3.23)
Not in the labor force	95.4		1.56	0.79	30.82	33.16
			(1.60)	(0.82)	(30.73)	(33.15)
Month 2 share		63.68		3.06	33.26	
		(63.70)		(3.11)	(33.19)	

Table A.4

Gross flows as a share of month 1 status

(alternative weights in parentheses)

Month 1 status	Match rate	Month 2 status				Month 1 share
		Same employer	New employer	Unemployed	Not in the labor force	
Employed	95.2	93.45	2.67	1.25	2.63	63.62
		(93.40)	(2.69)	(1.27)	(2.64)	(63.63)
Unemployed	91.9		30.01	46.05	23.94	3.22
			(29.98)	(46.04)	(23.98)	(3.23)
Not in the labor force	95.4		4.70	2.38	92.92	33.16
			(4.82)	(2.46)	(92.72)	(33.15)

We consider these finding to be lower-bound estimates of attrition bias, because they are constructed under the assumptions that matching is random within demographic groups and that the only correlation between attrition rates and transition rates stems from composition of the nonmatchers. Instead, individuals who leave the CPS sample because they or their households changed residences are probably more likely to have changed employer or labor market state than are individuals who remain in the sample, after one controlls for their demographic characteristics. Accordingly, we further divide nonmatchers into movers and nonmovers. Movers are those individuals and households that appear likely to have left the CPS sample because they changed address, whereas nonmovers are those individuals who either left the sample temporarily or who appear most likely to have not matched because of coding error. Specifically, we classify a nonmatching individual as a mover if any one of the following statements is true: (1) Another household replaces the individual's household in the second

month of our sample;[48] (2) the individual's entire household is not interviewed in the second month and does not match in the third month, or (3) the individual is not interviewed in the second month and does not match in the third month although other members of the household remain in the sample. We classify individuals as nonmovers if either of the following conditions is true: (1) The individual that is absent in the second month has a successful match from the first to the third month, or (2) the individual appears to have been interviewed in the second month but for some unknown reason does not match from the first to the second month.

Under this scheme, we classify 48 percent of the nonmatches in 1998 as movers. Of these movers, 18 percent are in households that were replaced in the second month, 46 percent are in households that were not interviewed in month 2, and the remaining 36 percent are individuals who appear to have moved out of households that continued in the CPS sample. Similarly, we classify about 45 percent of the nonmatches who were employed in month 1 as movers. If we assume that all employed movers separate from their first-month job, the true job leaving rate will be about 2-1/4 percentage points higher than the 6.6 percent reported in the body of the paper. This difference should be considered as an upper bound estimate for the size of the attrition bias, as many movers likely did not change jobs or leave employment--especially those who move to a new location within the same labor market area.

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[48]Because we excluded the first and fifth rotation groups from our sample, the second month in our sample is actually the third month in the CPS sample.

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Figure 1

EE (as a Percent of Employment) by Age

Separations (as a Percent of Employment) by Age

Accessions (as a Percent of Employment) by Age
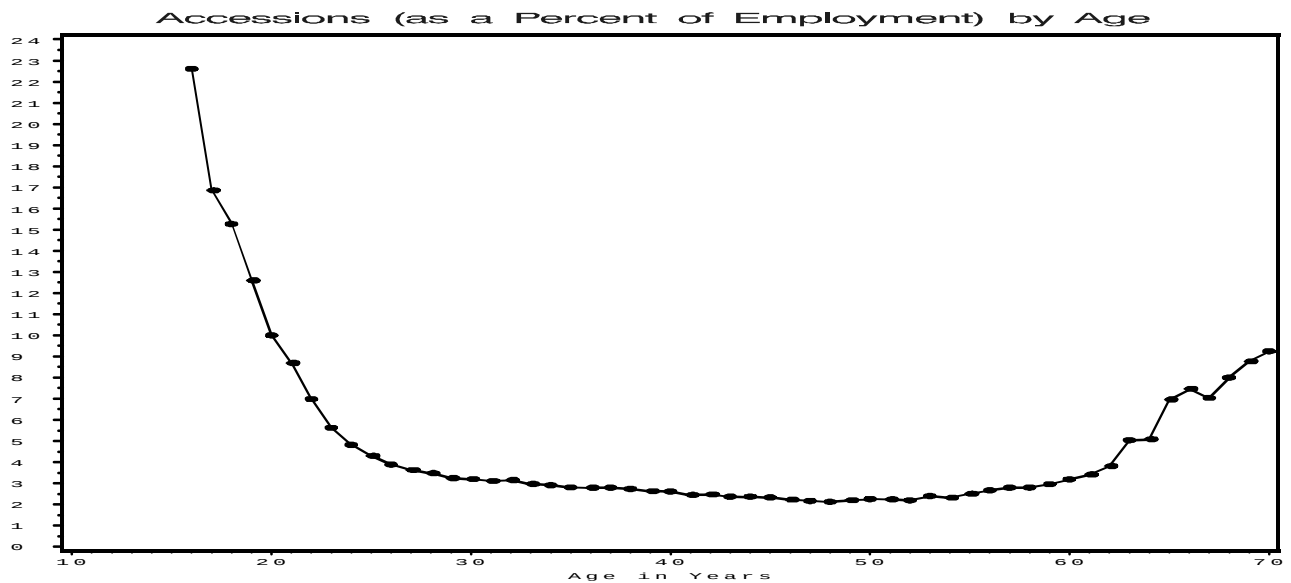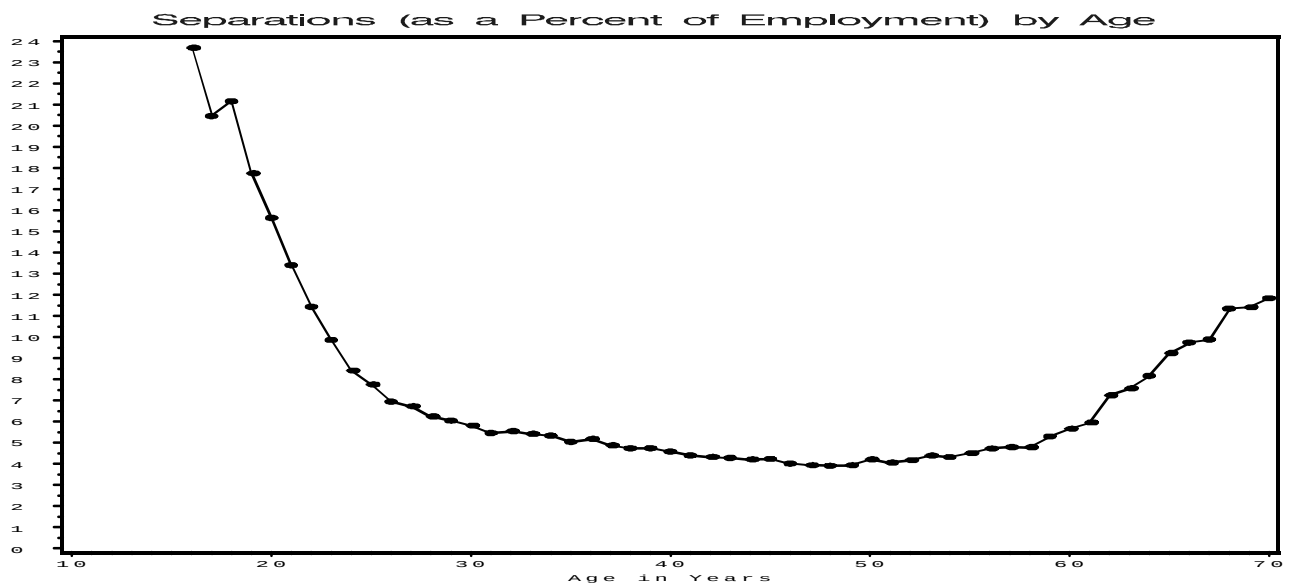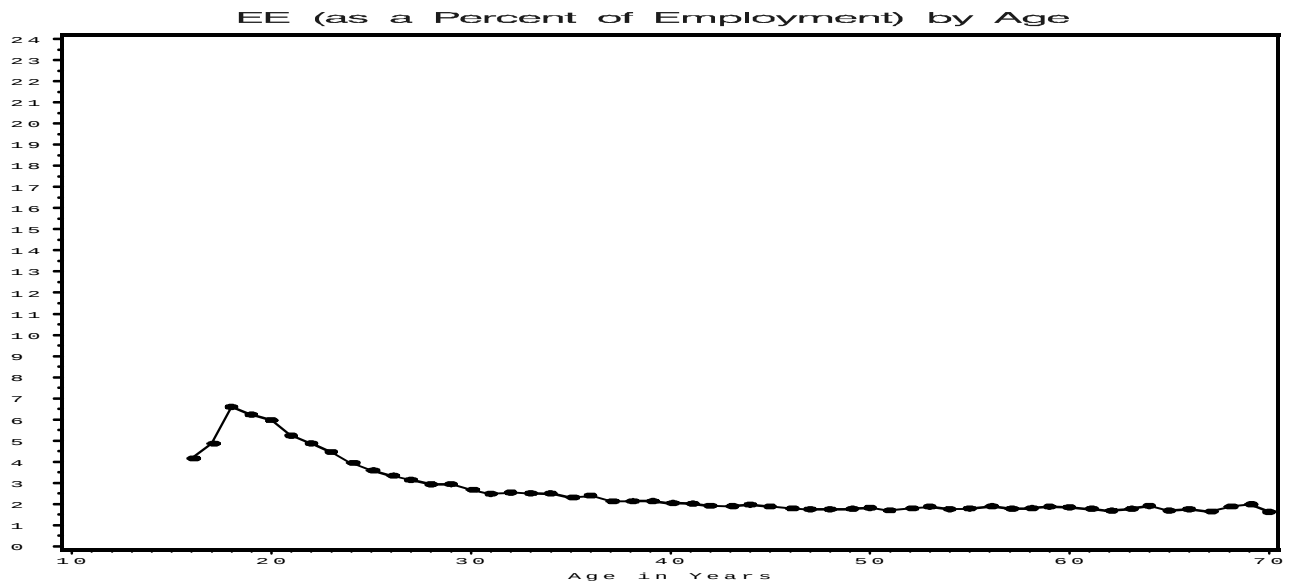
Figure 2
(Percent of Population)
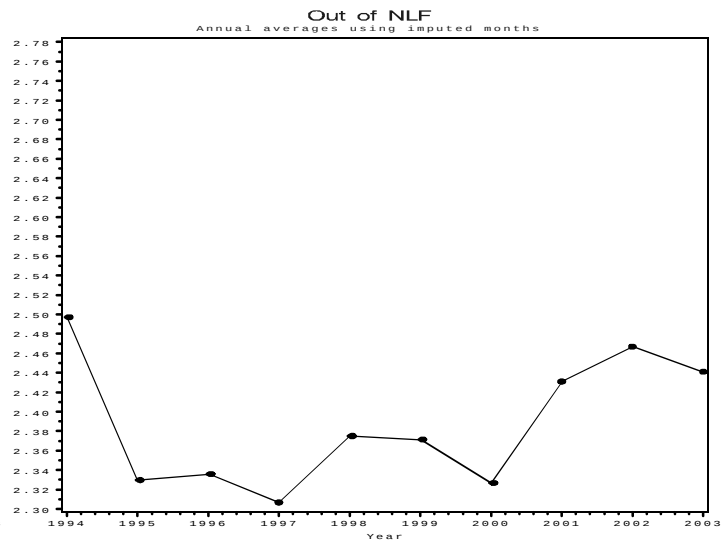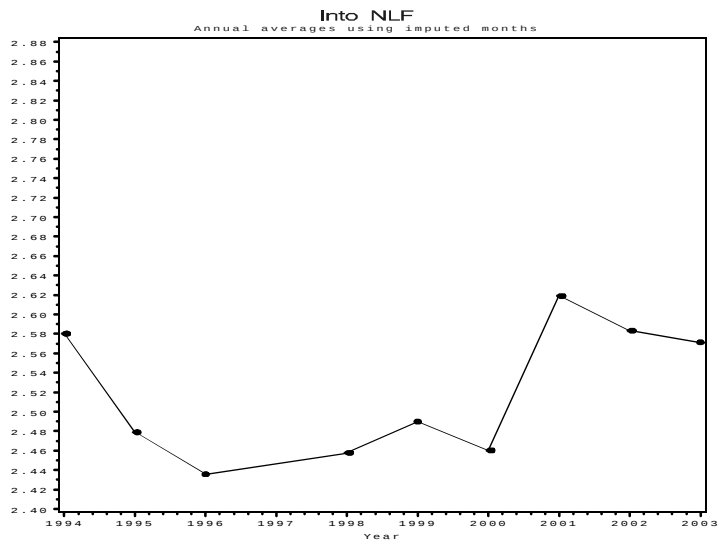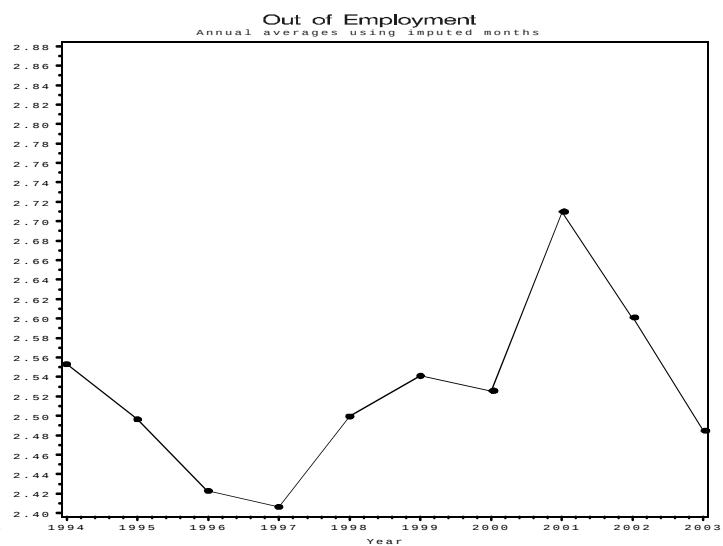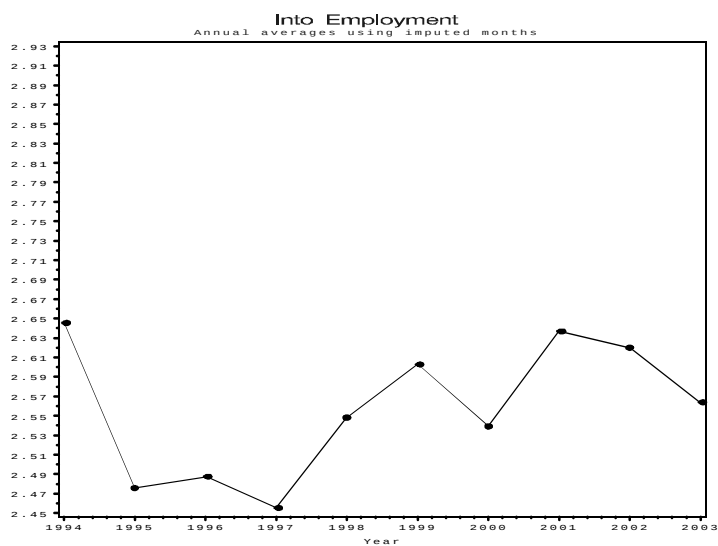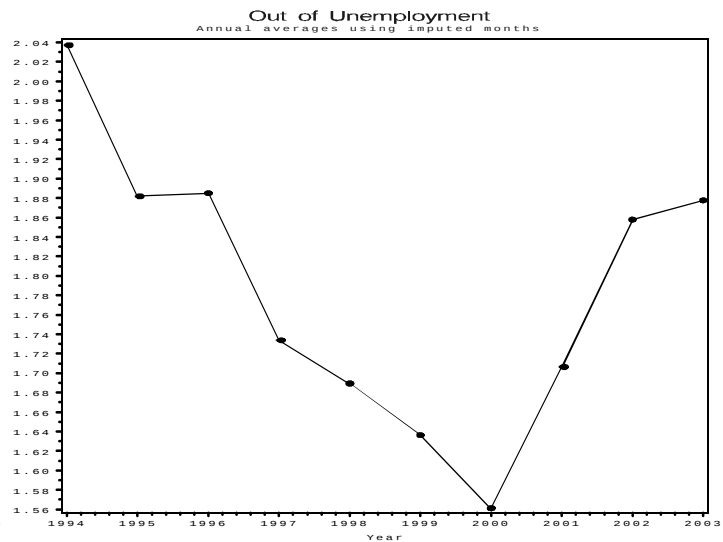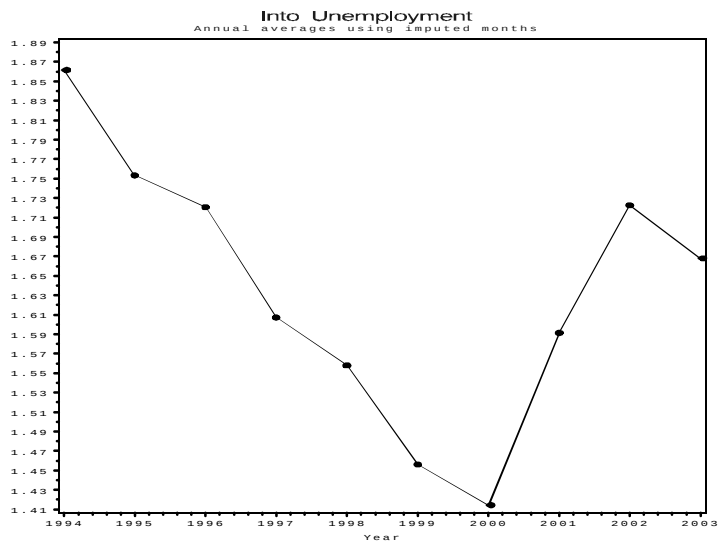
Figure 3

(Percent of Population)
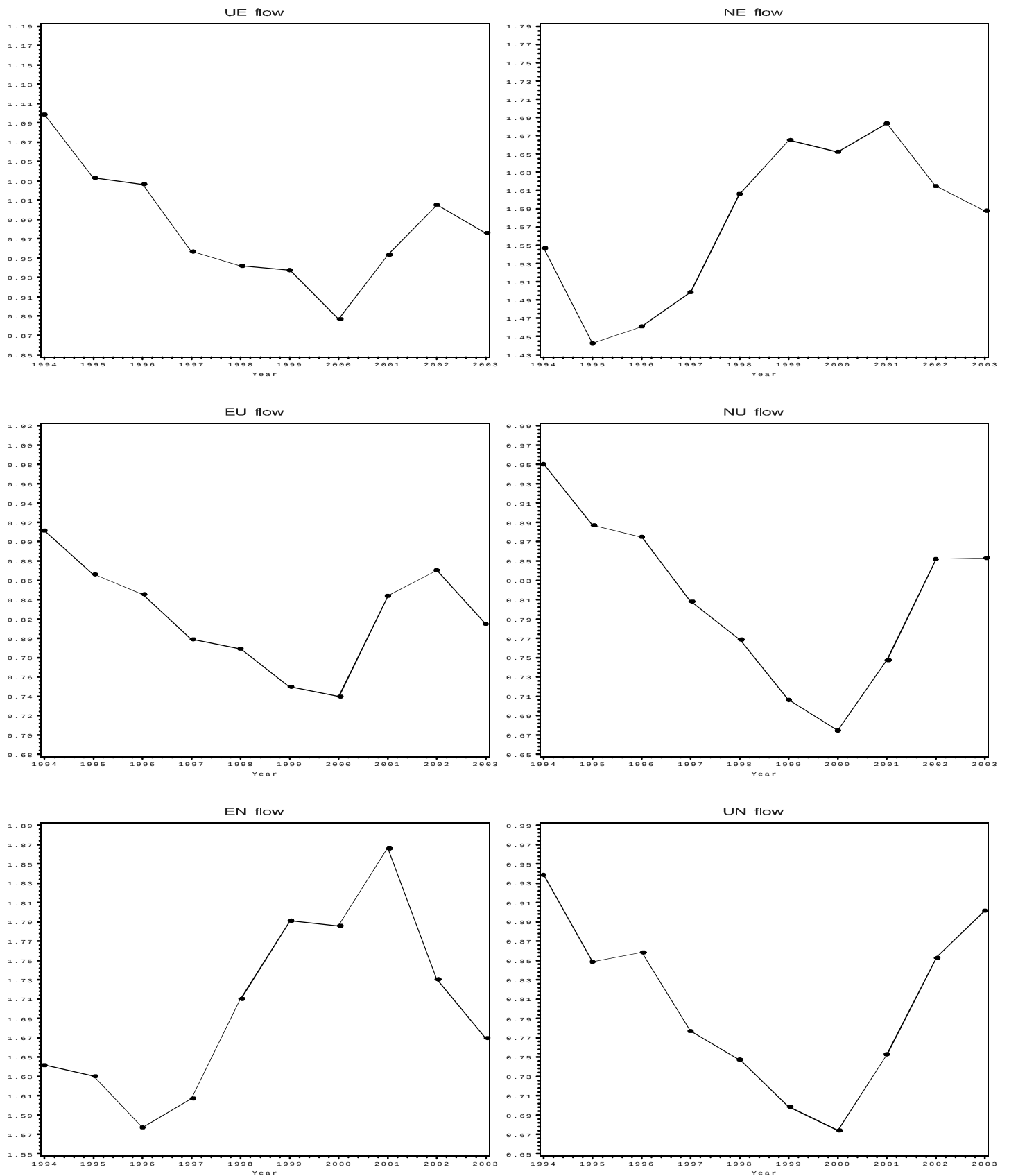
Figure 4
(Percent of Population)

Employer — to — Employer
Annual averages using imputed months