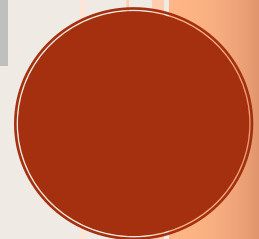# Unemployment, Marginal Attachment and Labor Force Participation in Canada and the United States

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Unemployment, Marginal Attachment and Labor Force Participation in Canada and the United States*

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ABSTRACT

We analyze changes in unemployment, marginal labor force attachment and participation in Canada and the U.S. Using two complementary decompositions, we show the importance for the comparative evolution of aggregate unemployment of changes in the fraction of the non-employed who are unemployed and in the fraction of the unemployed who 'want work'. Using microdata we study labor market transition behavior at these margins, finding remarkably consistent results in the two countries, with the marginally attached displaying behavior lying between unemployment and non-attachment. The three non-employment states are distinct from one another in both Canada and the U.S.

1. Introduction

The Canadian and U.S. economies are closely linked through trade and industrial structure, and share many common features. Although their macroeconomic experiences since the end of World War Two are broadly similar, there are nonetheless noteworthy differences. Throughout the early postwar period key labor market aggregates such as the unemployment rate followed very similar patterns (Card and Riddell, 1993). However, in recent decades labor markets have evolved quite differently north and south of the border. Whereas Canada experienced much more severe recessions in the 1980s and 1990s, since the turn of the century economic downturns hit substantially harder in the U.S., especially during the Great Recession of 2007-09.

The Canadian recession of the 1980s was deeper and more long-lived than that of the U.S., resulting in the emergence of a substantial unemployment differential between the two countries. This Canada – U.S. unemployment rate gap persisted throughout the period of economic expansion during the late 1980s, leading to much debate about the reasons behind this deterioration in a key economic indicator. However, Canada's higher level of unemployment during that decade did not result from poorer employment performance. Indeed, the two countries' employment-population ratios were fairly similar in the early 1980s and grew closer during the subsequent boom in the latter part of the decade. The greater tendency of non-employed Canadians to be classified as unemployed was an important element in understanding this comparative evolution (Card & Riddell, 1993; Riddell and Sharpe, 1998). A key insight from this earlier work on Canada – U.S. differences in aggregate labor market behavior was the role of the margin between Unemployment (U) and Out-of-the-Labor-Force (O), with the comparative evolution of unemployment hinging more on this margin than on the U to Employment (E) margin. This gave rise to research that probes the U-O margin in new ways (e.g., Jones & Riddell, 1999, 2006; Card, Chetty and Weber, 2007; Barnichon and Figura, 2015; Elsby, Hobjin and Şahin, 2015).

This paper assesses changes in unemployment, marginal labor force attachment and labor force participation in Canada and the U.S. over the past two decades. Building on our earlier research with Canadian data (Jones and Riddell, 1999, 2006),

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we use a model with four potential labor market states: E, U, M (marginal attachment), and N (non-attached to the labor force), adopting the standard definitions of E and U, while those not in the labor force are split into M and N according to a reported desire for work criterion (so that M+N=O). Since the inclusion of a desire for work question in the monthly Labour Force Survey (LFS) and Current Population Survey (CPS) in the 1990s, such a classification system can be estimated and tested with Canadian and U.S. data and is a natural means of exploring the role of the U to O margin in understanding the fluctuations of unemployment and participation.

Using aggregate data we decompose changes in the unemployment rate between cyclical peaks into contributions due to changes in the non-employment rate P(NE), the labor force participation rate P(LF) and the probability of unemployment given non-employment P(U|NE). Building on the four state classification of labor force activity, we also decompose movements in the unemployment rate into contributions from changes in the probability of wanting work P(W) = P(U+M), the participation rate P(LF) and the probability of actively searching given the desire for work P(U|W). These decompositions yield insights into Canada – U.S. differences in the role of labor force attachment, the desire for work and search activity in understanding movements in unemployment and labor force participation since the late 1970s.

With microdata from the CPS and LFS we analyse labor market transitions among the 4 states E, U, M and N and examine equivalence between pairs of states. Given the rotation group structure of the surveys we create 4-month panels with the CPS and 6-month panels with the LFS. We extend our earlier work for Canada (Jones and Riddell, 1999, 2006) to cover the period 1997 to 2015, and continue to find that marginal attachment is a distinct state, with transition behavior significantly different from that of U and N. A key contribution of the paper is to carry out a similar analysis for the U.S. over the period 1994 to 2015. The central finding that U, M and N are distinct non-employment states also holds for the U.S. Indeed, the transition rates among the four states are remarkably similar in the two countries. We also examine subsets of U, M and N such as passive job searchers, discouraged workers and those waiting for a job to start in the future.

In both countries a four-state model that distinguishes between marginal attachment and non-attachment provides a deeper understanding of labor force activity than the standard three-state framework. We also find noteworthy differences between Canada and the U.S. in the level and cyclical movements in marginal attachment.

2. Measurement Differences

Both Canada and the U.S. comply with guidelines established by the International Labour Organisation (ILO) for the measurement of employment, unemployment and labor force participation (Sorrentino, 2000, Exhibit 1). They also use very similar monthly household surveys – the Labour Force Survey (LFS) and the Current Population Survey (CPS) respectively -- to provide timely information on labor force activity. Although the questionnaire structure and content of these surveys are very similar, there are nonetheless some important differences affecting measures of labor force activity in the two countries (Riddell and Sharpe, 1998; Sorrentino, 2000; Bernard and Usalcas, 2014; Bender 2016). In the case of the margin between unemployment and non-participation, these reflect different interpretations of key criteria such as 'availability for work' and 'actively searching for work.' The principal measurement differences include:[1]

1. The adult population is defined as those 15 years of age and older in Canada, but 16 years of age and above in the U.S.

2. With the exception of the treatment of full-time students, the U.S. definition of unemployment is more restrictive than its Canadian counterpart. Three groups of individuals are defined as being unemployed in Canada but are measured as out-of-the-labor force in the U.S.: (i) individuals who searched for work in the month prior to the reference week of the survey, but who only used 'passive' search methods such as 'looked at job ads'; (ii) those who did not look for work but reported that they had a job to start within the next 4 weeks – a group referred to as 'short-term future job starts'; and (iii)

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[1] As Sorrentino (2000) points out there are a number of other differences in U.S. and Canadian concepts such as the treatment of unpaid family workers and the criteria for classification of temporary layoffs (expecting recall within 6 months or having a specified recall date in the U.S. versus expecting recall within 12 months in Canada). These are believed to be quantitatively less important than the factors listed in items 1-3 above.

individuals who reported that they were not available for work because of personal or family responsibilities.

3. Full-time students who report that they are looking for full time work are not considered 'available for work' in Canada and are classified as non-participants, but are classified as unemployed in the U.S.

These seemingly "small differences" in concepts and definitions can have a non-trivial effect on measures of aggregate labor force activity. In the Appendix, we plot the Canadian employment, labor force participation and unemployment rates using both Canadian and U.S. concepts over the period 1976 to 2015. As in Bernard and Usalcas (2014), these alternative measures of the same underlying labor force indicator take into account items 1 to 3 above. Use of U.S. concepts (specifically dropping 15-year olds, a group with an employment rate substantially lower than those 16 and above) results in a higher employment rate, the differential being 1.0 to 1.1 percentage points in the late 1970s, and in the range 0.6 to 0.7 during the past two decades. Use of U.S. concepts also results in a higher measured participation rate throughout most of the period since the mid-1970s. In this case the gap in measured labor force participation is largest early in the sample period – in the order of 0.8 to 1.0 percentage points in the late 1970s – but narrows over time to 0.3 percentage points in 1990 and 0.2 in 2000. Since 2012 there is no difference in labor force participation measured using BLS and Statistics Canada concepts. The measured participation rate differences reflect offsetting factors. Defining the adult population as those 16 and over raises participation, as does the U.S. practice of treating full-time students looking for full-time work as unemployed. However, the more restrictive U.S. definition of unemployment (item 2 above) lowers participation as measured using U.S. concepts. Finally, the most striking differences associated with measurement definitions north and south of the border are those affecting the unemployment rate, the statistic that receives the most substantial media and public attention.[2] The aggregate unemployment rate measured using U.S. concepts is systematically lower than that using Canadian definitions, and the gap between the two has increased steadily over time, from a difference of 0.2 to 0.3

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[2] Statistics Canada now includes the unemployment rate measured using U.S. concepts among its "Alternative Measures of Unemployment."

percentage points in the late 1970s to 1.0 percentage points since 2010. This large gap in measured unemployment reflects the fact that items 1 and 2 (which lower measured unemployment based on U.S. concepts) are quantitatively more important than the treatment of full-time students (item 3 above).

Because of the magnitudes of these differences, when feasible we adjust the Canadian LFS data to correspond to U.S. concepts. Thus, in parts of the paper we report two measures of labor force activity in Canada based on LFS data: the official measures based on Canadian definitions and the adjusted measures based on U.S. concepts.

The rotation group structure of the LFS and CPS also differs. LFS respondents remain in the survey for 6 consecutive months and then exit the survey. In contrast, CPS respondents remain in the survey for 4 consecutive months, exit for 8 months and then return for a further 4 months. This structure implies that CPS respondents participate in the survey for the same four calendar months in two consecutive years. In both surveys respondents are not followed if they move to a different location. For our microdata analysis of labor market transitions we link respondents across the 6 (LFS) or first 4 (CPS) months that they remain continuously in the survey and construct 6-month and 4-month panels. Individuals or families that did not remain in the survey for the full period – either those who moved or stopped responding – are thus not included in the analysis of transitions among labor force states.[3]

3. The Margin between Unemployment and Non-Participation: Aggregate Evidence

Conventional measures of aggregate labor force activity make a sharp distinction between unemployment U and non-participation O. However, statistical agencies generally recognize that this distinction is not easily made. Both the U.S. Bureau of

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[3] A natural concern here is non-random attrition – for example, if those who move differ in systematic ways (perhaps relating to their labor market transition behavior) from those who remain in the same residence during the time span of the survey. Our assumption is that non-random attrition is not a major concern over the brief time periods covered by these monthly surveys. Evidence supporting this assumption is provided by comparing our LFS results using balanced 6-month panels for the sample period 1997 – 2000 to the transition rates we estimated using all transitions over the same sample period (i.e. unbalanced panels) in our earlier study (Jones and Riddell, 2006). The results are very similar, and generally only differ in the third decimal place. Use of balanced 4-month and 6-month panels also has the important advantage that the composition of our samples used to analyse transition behavior does not change over time.

Labor Statistics (BLS) and Statistics Canada regularly report 'Alternative [or Supplementary] Measures of Unemployment' that include both more restrictive and broader measures of unemployment (and thus broader and more restrictive measures of non-participation). Our previous research with Canadian data documents the extent of heterogeneity among the non-employed and specific survey questions that help identify groups on the margin between unemployment and non-participation (Jones and Riddell, 1999, 2006). A salient finding is that the response to the question "Did you want work?" -- asked of those without work who did not recently search -- has remarkably strong explanatory and predictive power.

For many years, Canada and the U.S. have asked questions about the desire for work among the non-employed who were not searching for work.[4] Those who responded that they 'wanted work' were asked additional questions regarding reasons for not searching. In the CPS these questions were included in the "outgoing rotation group" (ORG) supplements and in the case of Canada they were asked in the Survey of Job Opportunities (SJO) – a LFS supplement usually carried out in March. With the revisions to the CPS that came into effect in January 1994 and those to the LFS that came into effect in January 1997, both flagship surveys now contain a monthly question about the desire for work among non-searchers, as well as questions probing the reasons for not searching among those who state that they want work. Based on our previous research with Canadian data, we classify LFS and CPS respondents into three main non-employment states: unemployed U (those conventionally measured as unemployed), marginally attached M (non-searchers who state that they want work), and non-attached N (those who neither searched for or desired work).

At the outset, it is worth noting that the M group is quite large, relative to the pool of those counted as unemployed. Figure 0 graphs the ratio of the "Want Work" group to the Unemployed for the U.S. since 1976 and Canada since 1979.[5] Three

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[4] The CPS has asked non-searchers whether they desire work since 1967, and the LFS since 1979.

[5] The observations are annual averages of the monthly data since 1994 in the US and 1997 in Canada. Prior to those years the US and Canadian observations are based on the CPS ORG and March SJO data respectively. We adjust the CPS ORG data to reflect the average difference between the ORG observations and the annual average CPS data during the period the two overlap (1994-2006), and because of seasonality in the monthly data we adjust the March SJO data to reflect the average difference between the March and annual average observations in the LFS from 1997-2016.

differences are evident. The size of this group differs between the two countries. In the U.S. the values for this ratio range from around 40% to around 100% whereas the ratio of the marginal attachment group to the unemployed is much lower in Canada throughout the sample period – ranging from about 25% to 40%. There also appears to be less cyclical variation in the M/U ratio in Canada than in the U.S.[6] Finally, M/U is trending downward in the U.S. over this time period but is relatively stable in Canada.

The greater proportion of non-employed workers on the margin of the labor force in the U.S. is consistent with the more stringent definition of unemployment used by the BLS. For example, those using only passive search methods are classified as unemployed in Canada but non-participants in the U.S. Almost all such passive searchers in the CPS respond that they do indeed "want work" so that, in our 4-state classification of labor force activities, these individuals would be U in Canada but would be M in the U.S. Similarly, non-searchers who have a job to start within a month are treated as out-of-the-labor force in the U.S. but as unemployed in Canada; many of these individuals may state that they want work. It is difficult to determine exactly the extent to which such measurement differences can account for the higher M/U ratio south of the border since we lack the requisite data; for example, since the 1994 changes to the CPS the 'future job starts' group is no longer identified.   Nonetheless, we have strong grounds for thinking that these measurement issues only account for a small part of the Canada-U.S. gap in the M/U ratio. Future job starts typically account for no more than 3% of the unemployed in Canada (Statistics Canada, 1999) and, if U.S. experience since 1994 is similar, their numbers are unlikely to have more than a tiny effect on the Canada-U.S. gap in M/U. Similarly, if all passive searchers (as measured in the CPS) were moved from M to U in a manner consistent with Canadian measurement, the U.S. measure of the M/U ratio would fall an average of 0.053 (on a mean value of 0.607) over the whole period 1994-2015. While measurement differences do therefore account for some

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respectively. In the Canadian series pre-1997, data are interpolated for years when an SJO was not conducted.

[6] We say "appears" because in fact the percentage deviations from the fitted trend lines are very similar in the two countries. See the Online Appendix figure A1.

of the gap north and south of the border, the U.S. ratio remains substantially higher than that in Canada even when measured on a comparable basis.

In this section we provide evidence on the importance of the margins between unemployment and non-participation and between wanting and not wanting work to movements in the unemployment rate. To explore the first margin we follow Card and Riddell (1993) who note that the unemployment rate P(U|LF) can be written as follows:

$$P(U|LF) \ = \ P(U|NE) * P(NE) \ / \ P(LF) \qquad\qquad (1)$$

where P (.) represents probability, P(U|LF) is the conventional unemployment rate (the fraction of the labor force that is unemployed), P(NE) is the non-employment rate (1 minus the employment rate), P(LF) is the labor force participation rate and P(U|NE) is the fraction of the non-employed that is unemployed, a measure of the 'labor force attachment of the non-employed.' Taking logs,

$$\ln P(U|LF) \ = \ \ln P(U|NE) \ + \ln P(NE) \ - \ln P(LF) \qquad\qquad (2)$$

Thus movements in the unemployment rate can be decomposed into three components: changes in labor force participation, changes in non-employment, and changes in the labor force attachment of the non-employed.

Figures 1-3 plot the individual components of this decomposition for both countries over the 1976-2015 period. We show the Canadian series using both Canadian and U.S. concepts. As illustrated in Figure 1, the non-employment rate was very similar in both countries during the late 1970s and the decade of the 1980s. However, Canada's non-employment rate rose much more than that of the U.S. during the recession of the early 1990s and a large gap of 3 to 4 percentage points persisted through the remainder of that decade. However, apart from a small increase from 2000 to 2001, the Canadian non-employment rate continued to decline during the period 2000-2007, while that of the U.S. rose sharply over the 2000-2003 period, closing the gap between the two countries. With the onset of the Great Recession, the U.S. employment rate declined sharply while that of Canada fell a modest amount, resulting in a non-employment rate differential of 2 to 3 percentage points that continued until 2015.

Figure 2 shows the behavior of the participation rate in the two countries. During the late 1970s and the decade of the 1980s, labor force participation was

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lower in the U.S. than in Canada but participation increased to a similar extent on both sides of the border. However, as was the case for employment, behavior north and south of the border diverged substantially during the 1990s. Participation rose moderately in the U.S. and displayed little response to the recession of the early 1990s. In contrast, participation fell sharply during 'the Great Canadian Slump' (Fortin, 1996) and did not fully recover to its pre-recession level by the end of the decade. This pattern was reversed in the 2000s, with U.S. labor force participation falling steadily, especially after 2007,[7] while participation rose in Canada during the period 2000-2007 before beginning a downward trend. By 2015 the labor force participation rate was approximately 3 percentage points lower in the U.S. than in Canada, the largest inter-country gap over this 40-year period.

The behavior of the third component, the fraction of the non-employed that is unemployed, is displayed in Figure 3. As noted previously, p(U|NE) was similar in the two countries in the late 1970s and early 1980s, but rose much more substantially in Canada during the recession of 1981-82 and remained 3 to 4 percentage points higher in Canada throughout the subsequent recovery and expansion. This large gap persisted throughout the 1990s. Since 2000 the differential has narrowed, with p(U|NE) in the U.S. rising above its value in Canada during the Great Recession. However, that narrowing appears to be largely cyclical, with the labor force attachment of the non-employed falling much more in the U.S. during the recovery and being once again lower in the U.S. than in Canada in the final two years of the sample period.

Appendix Table A1 reports the results of the decomposition (2) for Canada (Table A1a) and the U.S. (Table A1b) over the period January 1976 to December 2015. To abstract as much as possible from cyclical movements we examine movements in unemployment between cyclical peaks in each country. We use the NBER business cycle dates for the U.S. and Cross and Bergevin (2012), who follow a similar methodology, for Canada. The beginning and end months (January 1976 and December 2015) were not cyclical peaks, but the other four time intervals correspond to a complete business cycle in each country. One of these cycles is

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[7] Krueger (2016) is an in-depth analysis of the recent decline in U.S. participation rates with particular focus on differential behavior of different demographic groups.

short-lived (January 1980 to June 1981 in Canada and January 1980 to July 1981 in the U.S.) but the remaining three cycles cover approximately the decades of the 1980s and 1990s together with the decade of the 2000s prior to the Great Recession of 2008-9. [8]

Examining the results of this decomposition for these major business cycles in Canada (Table A1a) reveals that movements in P(U|NE) were a major factor in all three time periods, and the dominant factor in the 1980s and 1990s. For example, during the period from June 1981 to March 1990 the log change in unemployment was 0.014, an increase of 1.4%. Changes in the employment rate and the labor force participation rate contributed to a decline in the unemployment rate. However, these factors driving down unemployment were more than offset by the very large increase in P(U|NE). Similarly, in the 1990s cycle, changes in both non-employment and labor force participation contributed to a rise in unemployment but these two components were more than offset by the large decline in the labor force attachment of the non-employed, resulting in an overall decline of 1.4% in the unemployment rate. Finally, during the period June 2001 to October 2008, when Canada experienced a major resource boom, the unemployment rate declined by a substantial 15%. In this case all three components contributed in the same direction. The decline in the employment rate was the largest contributing factor, followed closely by the decline in P(U|NE).

The U.S. experience reveals some similarities but also noteworthy differences. The business cycles during the decades of the 1980s and 1990s saw much larger declines in unemployment than the small changes in Canada. Offsetting these substantial declines, the period from March 2001 to December 2007 produced a rise in unemployment of 15%, in contrast to the decline of the same magnitude in Canada. However, a common factor is the importance of movements in P(U|NE) to changes in the unemployment rate. In all three business cycles the change in the labor force attachment of the non-employed was the largest contributing factor. Changes in the employment rate and participation rate also contributed in the same

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[8] In 2001 the U.S. experienced a recession associated with the bursting of the dot-com bubble, whereas Canada only experienced a significant slowdown in economic activity. Exports to the U.S. declined for three consecutive quarters, but Canadian real GDP fell only in the 3rd quarter. Although not classified as a recession by Cross and Bergevin (2012), we treat June 2001 as a cyclical peak in Canada so that business cycles in the two countries cover comparable periods of time.

direction, but their impacts on unemployment were smaller, in most cases much smaller.

Tables 1a (Canada) and 1b (U.S.) provide similar decompositions of changes in unemployment rates between cyclical peaks based on annual data. To facilitate cross-country comparisons, we have chosen cyclical peak years that are the same in both countries. Doing so yields three full business cycles: 1979-1989, 1989-2000, 2000-2007, together with the incomplete cycle 2007-2015.[9] The bottom row in each panel shows the decomposition results for the entire sample period 1979-2015. The findings are very similar to those with the monthly data. In Canada, changes in P(U|NE) make by far the largest contribution to movements in the unemployment rate during the cycles of the 1980s and 1990s, more than offsetting contributions in the opposite direction by movements in employment and participation. In the latter two periods 2000-2007 and 2007-2015 all three components influence the unemployment rate in the same direction, with changes in P(NE) and P (U|NE) making the largest contributions.

The U.S. experience was quite different. During both the 1979-89 and 1989-2000 business cycles unemployment fell much more in the U.S. than in Canada. In the 1980s the dominant forces behind the 9% decline in the unemployment rate were changes in employment and labor force participation. In contrast, the main factor contributing to the 28% decline in unemployment in the roaring 1990s was the fall in P(U|NE). Changes in the labor force attachment of the non-employed were also the main factor contributing to the rise in unemployment over the 2000-2007 period. However, movements in P(U|NE) played only a minor role in the rise in unemployment during and since the Great Recession. The fall of the employment rate was the largest contributing factor during this period of time.

Taking Canada – U.S. differences of equation (2) allows us to decompose difference-in-differences in movements of unemployment in the two countries over the main business cycles of the 1980s, 1990, and 2000s. These results are reported in Table 1c. In the 1980s—the decade in which a persistent Canada – U.S. unemployment gap first emerged—the dominant factor in the relative rise of

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[9] Note that by choosing 1979 and 1989 as cyclical peaks we are merging the brief January 1980 to June/July 1981 cycle with the longer business cycle that covered mid-1981 to early 1990. Results are not sensitive to this choice.

unemployment in Canada was the increase in P(U|NE) in Canada relative to the U.S. Relative changes in the employment rate and labor force participation played only minor roles. During the 1990s Canada's unemployment rate declined much less than that of the U.S., and the most important contributing factor was the smaller decline in P(U|NE) in Canada than that experienced in the U.S. However, Canada – U.S. differences in the employment and labor force participation rates also contributed. During the 2000-2007 cycle Canada's unemployment rate fell while that of the U.S. increased, resulting in a relative change in unemployment of more than 26%. All three factors contributed with Canada's decline in P(U|NE) relative to the U.S. being the most important factor. The 2007-2015 period was dominated by the Great Recession in the U.S.—a downturn that was much more severe and long-lasting than its Canadian counterpart—but also subsequently by the end of the resource boom in Canada and concomitant slower employment growth than south of the border. The combination of these factors was little relative change in unemployment, with the rise in P(U|NE) in Canada relative to the U.S. pushing toward an increase in the unemployment rate differential and changes in the relative non-employment rate and labor force participation rates pushing in the opposite direction.

The bottom row in Table 1c reports the Canada – U.S. unemployment rate difference-in-differences decomposition for the period 1979-2015. Although the economies of both countries were arguably further from a cyclical peak in 2015 than they were in 1979, this decomposition nonetheless provides a useful summary of the contribution of each factor to the inter-country movements in aggregate unemployment over this 35-year period. Interestingly, there was almost no change in the Canada – U.S. unemployment rate gap over this period. However, underlying this small change in relative unemployment were large movements in the components contributing to unemployment rates. The increase in p(U|NE) in Canada relative to the U.S. was the most important factor, contributing to a 13 percent relative increase in unemployment. This was approximately offset by changes in Canada's employment and labor force participation rates relative to the U.S., which combined to lower unemployment by more than 12 percent. This result reinforces the major role played by inter-country differences in movements in p(U|NE) in Canada – U.S. changes in aggregate unemployment.

The decomposition (1) explores the margin between unemployment and non-participation using the conventional three-state classification of labor force activity. The four state model allows us to also examine the role of the margin between those who want and do not want work. To do so we note that the unemployment rate P(U|LF) can be written as

$$P(U|LF) = P(U|W) * P(W)/ P(LF) \qquad (3)$$

where W = U+M consists of the non-employed who report that they desire work and P(U|W) is the fraction of those wanting work that is actively searching. Taking logs of equation (3) provides a decomposition of movements in the unemployment rate between cyclical peaks in each country as well as Canada – U.S. differences.

Utilizing the annual time series based on CPS and ORG data for the U.S. and SJO and LFS data for Canada described previously, Figures 4 and 5 plot the components P(W) and P(U|W) for the two countries over the period 1979 to 2015. The fraction of the adult population that is without work but wants work shows substantial cyclical variation in both countries. Although the patterns are broadly similar, some differences are noteworthy. In the 1980s P(W) in Canada rises from below the U.S. level prior to the 1981-2 recession to above during and after that downturn – by most measures Canada's worst recession of the post-war period. The gap had closed by the end of that decade but widened substantially in the recession of the early 1990s and persisted throughout that decade. During the 2000-2007 period the combination of a steeper downturn in the U.S. in 2001-2 and the resource boom in Canada resulted in substantial narrowing but not elimination of the inter-country P(W) differential. The pattern was reversed by the Great Recession which was accompanied by a substantial rise in P(W) in the U.S. relative to Canada, although by 2015 this difference had disappeared.

Figure 5 shows P(U|W), the fraction of those who want work that is actively searching. Several Canada – U.S. differences are evident. The Canadian level is substantially higher, and is more stable over time than its U.S. counterpart – generally in the range 0.70 to 0.75. P(U|W) in Canada displays a modest upward trend until the early 1990s followed by a slight downward trend subsequently, whereas south of the border P(U|W) displays a more substantial upward trend and greater cyclical variation.

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Table 2 reports the results of the decomposition (3). As before, we show the contributions of each component to the log change in the unemployment rate between cyclical peaks, corresponding to the business cycles of the 1980s (1979-89), 1990s (1989-2000) and early 2000s (2007-15), as well as for the recovery period 2007-2015 and the entire time period. For Canada (Table 2a), changes in P(W)—the fraction of the adult population without work and wanting work—is the dominant factor, both in cycles in which unemployment is falling (1990s and early 2000s) and in periods when unemployment is rising (2007-15). The one exception is the 1980s when rising participation was the largest contributor, while the increase in P(W) was also a major contributing factor working in the opposite direction. Note that P(U|W) plays only a minor role in all four time periods, indicating that it is the margin between wanting and not wanting work that is most important rather than the margin between searching and not searching. For the entire 1979-2015 period, P(W) contributes over 90% of the 8.3% decline in the unemployment rate, with changes in P(U|W) and P(LF) making small and offsetting contributions.

The U.S. experience reported in Table 2b shows a different pattern of unemployment rate changes during these cycles than did Canada. Nonetheless, the finding that changes in the fraction of the adult population wanting work P(W) constitute the most important factor contributing to movements in the unemployment rate also holds south of the border. In three of the four sub-periods changes in P(W) make the largest contribution, and in the remaining period (2000-2007) increases in P(W) and P(U|W) contribute approximately equally to the rise in unemployment. The significance of the contribution of changes in P(W) is evident both in periods of falling unemployment – such as the 1980s and 1990s – and rising unemployment since 2000. Over the entire 1979-2015 period changes in P(W) make by far the largest contribution, with movements in P(U|W) contributing about half as much in the opposite direction and changes in labor force participation being relatively unimportant.

The final panel reports Canada – U.S. differences-in-differences. During the 1980s the relative rise in P(W) is the main factor contributing to the increase in unemployment in Canada relative to the U.S., with some offset from relative changes

in P(U|W). In the 1990s virtually all of the increase in Canadian unemployment compared to the U.S. is due to the rise in P(W), as illustrated in Figure 4. Similarly, the largest contribution to the decline in Canadian unemployment relative to the U.S. during the 2000-2007 period is that associated with the relative decline in the fraction of the adult population wanting work in Canada. The final sub-period (2007-2015) is an exception; in this case there is little change in relative unemployment, with the change in P(U|W) pushing toward a rise in relative unemployment and changes in P(W) and P(LF) making equal contributions in the opposite direction. Over the entire 1979-2015 period—one in which there was little change in the Canada – U.S. unemployment rate gap—the relative rise in P(W) in Canada accounts for an increase in unemployment of 14.5% while changes in P(U|W) and P(LF) account for a decline in relative unemployment of essentially the same size.

In summary, the aggregate unemployment rate can be influenced by several underlying factors. The decompositions (1) and (3) provide complementary insights into the influences of various factors on the recent experience of Canada and the U.S., as well as our understanding of inter-country differences. Within the context of the traditional three-state model, changes in the labor force attachment of the non-employed have played a major role in the direction and magnitudes of changes in the aggregate unemployment rate in both countries over this 35-year period. In addition, Canada – U.S. differences in P(U|NE) have been the most important factor contributing to relative changes in unemployment. Although movements in the employment-to-population ratio and the labor force participation rate typically receive the lion's share of attention, it is clearly important to pay attention to changes in the fraction of the non-employed that are classified as unemployed. Additional insights are obtained using a model with three non-employment states in which non-participants are separated into the marginally attached – non-searchers who report that they desire work – and the non-attached. Building on this four state model of labor force activity, the decomposition (3) allows us to understand the relative importance of the margins between wanting and not wanting work as well as between searching and not searching for work among those who want work. A salient finding from this decomposition is the importance of the want/not want

work dimension. These results based on aggregate data highlight the heterogeneity of the non-employed category and the importance of understanding the behavior of various subsets of the non-employed. To do so we turn attention to microdata with which we can identify those on the margin between unemployment and non-participation.

4. Marginal Attachment: An Evidence-Based Approach

We now operationalize the notion of marginal attachment by applying it to microdata from Canada and the U.S. The conventional approach to classification of labor force states – and in particular to the separation between unemployment and non-participation – is based on *a priori* reasoning about what constitutes sufficient attachment to the workforce to warrant classification as 'unemployed.' Two *a priori* beliefs are imbedded in the ILO guidelines followed by many countries, including Canada and the U.S.: (i) *availability for work* -- a stated desire for work and/or evidence of searching for work are not relevant if the individual is not immediately available for work; and (ii) *job search* -- there needs to be evidence of search for work in order to demonstrate a serious desire to obtain employment. According to this perspective, statements such as one "wants a job" or "would like to work if suitable employment were available" are not regarded as demonstrating sufficient effort to warrant being classified as unemployed. The same principles apply to various forms of 'waiting' such as waiting for suitable jobs to open up or waiting for replies to previous applications.

In our previous research with Canadian data we argue for an "evidence-based" approach to the classification of labor force states. Rather than relying on *a priori* reasoning, this approach uses subsequent labor force status to assess which responses to survey questions (relating, for example, to indicators of availability for work and/or search activity) have empirical content. According to this evidence-based approach, two labor force states are behaviorally equivalent if they yield subsequent labor force outcomes that are statistically indistinguishable.[10] Similarly, states are distinct if their subsequent outcomes differ.

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[10] Flinn and Heckman (1983) is the key early reference on this approach. They tested whether 'unemployment' and 'non-participation' represent different non-employment states in the U.S. labor market. Jones and Riddell (1999) extended their framework to a four-state model, arguing that the

A clear finding from our previous work with Canadian data is that a stated desire for work among those who did not recently search for work has substantial predictive power in terms of subsequent labor force status. According to conventional definitions of unemployment and non-participation, the expressed desire for work plays no role in measures of labor force activity.[11] However, applying the evidence-based approach to earlier Canadian data yields strong evidence that marginal attachment – a state composed of non-searchers who express a desire for work – represents a distinct behavioral state, one that lies between unemployment and non-participation in terms of subsequent labor market outcomes. In this section we extend our previous research with Canadian data to the U.S. In addition we update our Canadian research to cover a longer sample period, and carry out a comparative analysis.

In order to analyze the predictive content of questions about the desire for work for future employment, it is necessary to use linked records and observe subsequent labor force status. This was not possible with U.S. data because the pre-1994 CPS posed "want work" questions only to those leaving the survey. Further, it was only possible for Canada in the pre-1997 LFS by utilizing a special linkage between the cross-sectional supplement – the Survey of Job Opportunities (SJO) – and the subsequent month of the LFS (for the 5/6ths of the SJO respondents who remained in sample for the next month's LFS). It was this linkage that permitted our earlier work (Jones and Riddell, 1999) to first assess the predictive content of responses to the desire for work question for subsequent labor market behavior. With the revisions in 1994 of the CPS and 1997 of the LFS, we now have the requisite data to generalize this earlier work on transition rates to a long sample period[12] and to make international comparisons.

We now turn to the analysis of transitions among labor force states, addressing the four state framework based on Employment, Unemployment,

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key behavioral and measurement issues involve those such as 'discouraged workers' on the margin between unemployment and non-participation.

[11] In the LFS and CPS individuals who were not employed (or temporarily absent from work) during the survey week are classified as 'unemployed' if they were available for work and had actively searched for work in the previous 4 weeks.

[12] Jones & Riddell (2006) studied related transition behavior using LFS data for the 1997-2000 period.

Marginal Attachment and Non-attachment (E, U, M, N). In Section 3, above, we used two decompositions (employment *vs* non-employment and "want work" *vs* non-attachment) to highlight the differential behavior of these magnitudes in the U.S. and Canada since the late 1970s. For the time period to be used in this section, we analogously note that the path of the ratio of the marginally attached to the unemployed (M/U) differs between the two economies. Comparing the U.S. data since 1994 and the Canadian data since 1997, two noteworthy differences are evident. The size of the M/U ranges from about 25% to 40% in Canada and is generally much lower in Canada than in the U.S., where the range is between 40% and 80%. There is also less cyclical variation in the M/U ratio in Canada than in the U.S. over this time period. These relative time series are presented in Figures U.S.0 and CAN0 in the Appendix.

For each set of transition rates, U.S. results are discussed first, followed by our updated results for Canada. Figures U.S.1 – U.S.4 and Table 3 report results from the CPS matched across months. We concentrate on month-to-month matching using the 4 month periods of consecutive observation of a household, and of individuals within that household, given the 4-8-4 rotation group structure of the CPS. The panels are thus shorter than those for the LFS, and in this paper we do not consider matching individuals on an annual basis given our interest in short-run dynamics. Figures CAN1-CAN4 and Table 4 report the month-to-month transitions based on our 6-month panels created from the LFS. In both countries we use balanced panels; thus the composition of the samples used to calculate transition rates remains constant over time.

Figures U.S. 1 to U.S.4 examine the time-series of these average transition rates for the period 1994-2015. For confidentiality reasons, geographic identifiers are not available and matching is not possible across different CPS months between 1995:2 and 1995:9, so all the U.S. series have a gap for these months. The results for transitions into Employment are shown in Figure U.S.1. The mean rate of transition from Unemployment (pUE) varies from 0.15 to nearly 0.4, displays regular seasonal patterns, and clearly varies with the business cycle. There is also evidence of some variation in the transition rate from Marginal Attachment into Employment, both seasonally and cyclically, although the influence of the business cycle is less marked.

Unsurprisingly, the rate at which individuals transit from Nonattachment into Employment is low, typically below 0.05. Perhaps the most important conclusion from Figure U.S.1, though, is the clear separation of the three series. In every month since 1994, the three transition rates are ordered as pUE > pME > pNE and the differences are large enough, given the CPS sample size, that equality would be rejected by a formal test. Thus, Figure U.S.1 is consistent with earlier Canadian work that found U, M and N to be behaviorally distinct states within non-employment, and hence consistent with the view that there is predictive power in both the job search question and the desire for work question posed in the CPS.

Turning to analogous Canadian evidence, Figure CAN1 plots the 1-month transition rates from non-employment into employment in each month over the period 1997-2015. There is a clear and substantial separation with pUE > pME > pNE in every month of our sample period. There is evidence of seasonal variation, as well as cyclical variation – as in the U.S. monthly data. The importance of seasonal variation is evidently greater in Canada. Although present in the Canadian data, the extent of cyclical variation is less pronounced, consistent with the recessions experienced during this time period being less severe north of the border.

The conclusion that the three non-employment states are behaviorally distinct is buttressed by Figures U.S.2-U.S.4 and CAN2-CAN4 that show similar time-series properties of average monthly transition rates into Unemployment, Marginal Attachment and Nonattachment respectively. As before, the Figures show the mean transition probability into a state (e.g., Unemployment) from each of the other states (e.g., Employment, Marginal Attachment and Nonattachment). Figure U.S.2 shows the flow into U from M as varying between 0.12 and 0.24, and rising strongly in the Great Recession and its aftermath. In Figure U.S.2 there is also cyclical variation in pEU and pNU although, given the scale, these cyclical inflows to unemployment are harder to see in the figure. Note that, although pEU and pNU have similar magnitudes, there is again a sharp separation between M and N as origin states within non-employment.

Figure U.S.3 highlights the flow from U to M that tends to decline somewhat in the Great Recession years but is generally less cyclical than the reverse counterpart. Since the Great Recession, pUM has trended upward in the U.S., but not

in Canada. Over this time period, there are also noteworthy differences between the two countries in the likelihood of entering marginal attachment – for example the mean value of pUM is .092 in the U.S. compared to .060 in Canada and pNM is about one-third larger in the U.S. (.024 versus .018). Finally, Figures U.S.4 and CAN4 show the high average rate of transition from M to N – typically between 0.4 and 0.5 per month in the U.S. – a rate of movement into Nonattachment that is much higher than that from Unemployment (which varies between 0.1 and 0.2). This difference holds for every month since 1994. Transition probabilities into Nonattachment from both U and M are also somewhat higher in the U.S. than in Canada, although pMN has been trending upward in Canada.

Together, these time-series graphs of micro-level average transition rates between states are strongly consistent with past research with Canadian data that suggested the distinct nature of the three non-employment states: Unemployment, Marginal Attachment, and Nonattachment. The large differences in the magnitudes of these flows suggests the merit of considering both job search and the desire for work in understanding the dynamics of labor markets.

We present U.S. evidence on average transition rates at various horizons in Table 3. The first panel records mean rates of transition from one of three non-employment states (Unemployment, Marginal Attachment, Nonattachment) to the four states examined in this paper (Employment, Unemployment, Marginal Attachment, Nonattachment), which are the averages of the series graphed in Figures U.S.1-U.S.4. The standard errors are uniformly small given the large CPS samples, so equality of these means is easily rejected.[13] One element of the first panel that might not have been evident from the figures (but could have been deduced) is the relative stability of each non-employment state, month-to-month. For example, the transition rate pUU, the average probability that an unemployed person in one month remains unemployed in the next, which is of course just 1 - pUE – pUM – pUN, has a point estimate of 0.518. Nonattachment is very stable as might be expected with pNN=0.923. But interestingly, Marginal Attachment has a

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[13] Our earlier work on Canadian data conducted statistical tests of these types of equivalence in a multinomial model of transitions, uniformly rejecting the equivalence of both U and M and M and N (Jones & Riddell, 1999, 2006). These rejections were both unconditional and conditional on gender, marital status, education, age and region.

"remain" probability pMM that averages only 0.277, so is the least stable non-employment state. This would appear to be inconsistent with the view that Marginal Attachment is in any sense an absorbing state, perhaps reached after a prior spell of Unemployment once a sense of discouragement with job search has set in.[14] It is, however, consistent with previous Canadian evidence on the relative stability of these non-employment states.

The lower panels of Table 3 show analogous mean transition rates at two longer horizons. Instead of examining adjacent months, as in the first panel, we here report results where, if the origin state is observed in period t, the destination state is observed in period t+2 (panel 2) and period t+3 (panel 3). Consistent with the point in time approach of the CPS recording structure, we do not here differentiate based on the intervening month or months. As might be expected, the transition rates into Employment rise with a potentially longer search period (although some of this may be a heterogeneity effect due to changes in the composition of the unemployed pool as we move to longer durations). This greater likelihood of obtaining employment effect is clearest moving from a one-month to a two-month horizon. At both longer horizons permitted by the 4-month CPS panels, though, the ranking of pUE > pME > pNE holds quite clearly, with pUE typically being about double pME which, in turn, is between three and four times larger than pNE, the mean transition rate from Nonattachment. The diagonal elements in the lower panels (pUU, pMM and pNN) usually decline with a longer horizon.

Table 4 reports mean values of month-to-month transition rates for Canada over the sample period January 1997 to December 2015. Based on our 6-month panels of LFS respondents we report transition rates over 1, 2, 3, 4, and 5-month horizons and, as in the case of the CPS, we disregard any intervening labor force state information in the construction of these rates. The first panel shows the average hazards between origin states (U, M and N) and destination states (E, U, M and N). For transitions into employment there is a clear difference between U and M as origin states, with the pUE hazard being 0.234, more than twice as large as the transition rate pME (0.108). Equally noteworthy, there is a clear difference between

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[14] Farber and Valletta (2015) address U.S. long-term unemployment following the Great Recession of 2007-2009 and assess the role of extended unemployment benefits in contributing to a rise in this long-term unemployment. See also Rothstein (2011) and Krueger, Cramer and Cho (2014).

the M and N categories, with the pNE hazard being only 0.034. These differences are quantitatively large, statistically significant and consistent with previous findings for the more limited sample period 1997-2000 studied in Jones and Riddell (2006).

The remaining columns in the first panel in Table 4 report the adjacent month hazards into the three non-employment states. For each destination there are large and statistically significant differences between origin states U and M and between origin states M and N. For example, the mean transition rates into U are 0.576, 0.200 and 0.022 for U, M and N respectively. Similarly substantial differences are evident for the marginal attachment and non-attachment destinations. The diagonal elements are also large, indicating considerable stability in respondents' labor force status from month-to-month. Marginal attachment is the least stable state, with a probability of less than 30% of remaining in that state from one month to the next, compared to the almost 60% probability of remaining unemployed and an over 90% chance of remaining out-of-the-labor force. Overall, the pattern of the hazards into non-employment states is consistent with that into employment, with U exhibiting the strongest attachment to the work force and N the least. Furthermore, there is a clear ordering of non-employment states, with pUE > pME > pNE, as well as pUU > pMU > pNU and pNN > pMN > pUN, indicating that M is an intermediate state with behavior between U and N, and distinct from both U and N.

The remaining panels of Table 4 report analogous mean transition rates where origin and destination state are measured 2 to 5 months apart. Broadly speaking, these estimates reinforce the conclusions from the first panel. All of the transition rates into Employment rise as the horizon lengthens, but the ordering and the separation indicate clear differences in the degree of attachment: even at the longest 5-month gap, the ordering is pUE=0.451 > pME=0.250 > pNE=0.080. It is striking that a self-reported desire for work in month t exhibits such empirical content for the employment probability half a year later.

Aside from the transitions rates into Employment, there are some other noteworthy elements of these lower panels of Table 4. The pUM and pMU rates are relatively invariant at longer horizons, while the diagonal probabilities fall for both pUU and pMM. The "remain" (diagonal) probability also falls at longer horizons for Nonattachment, although this effect is fairly slight.

5. Heterogeneity in Non-Employment States

The difficulty of distinguishing between unemployment U and non-participation O is illustrated well by the behavior of various sub-categories of U, M and N. At a point in time, countries differ in how some of these sub-categories are classified, and changes are also made within a country over time. Canada and the U.S. treat some of these sub-groups in a consistent manner, and differ in their treatment of others. For example, both countries classify non-employed respondents who did not search for work during the previous month as Unemployed if they report that they are on temporary layoff from their previous employer and expecting recall within a specified period of time.[15] However, as previously noted, the two countries differ in their treatment of non-searchers who report that they have a job to start within a specified period of time, a group referred to as "future job starts." In Canada these individuals are classified as Unemployed providing their job is expected to start within 4 weeks. In the U.S. these "short term future job starts" respondents are classified as Out-of-the-labor force (unless they also report active job search), although prior to the 1994 changes to the CPS they were treated as Unemployed. As a final example, in both countries "discouraged workers" – those who report that they are not searching for work because they believe that no suitable work is available -- often receive considerable policy attention. Discouraged workers were counted among the unemployed in the U.S. prior to 1967 and in Canada prior to 1975, but subsequently have been classified as non-participants. In our analysis they are a subset of the Marginally Attached.

In this section we examine the transition behavior of various sub-categories of U, M and N.[16] Because of Canada – U.S. differences in how some of these sub-categories are treated, their primary non-employment category may differ from one country to the other.

Table 5 details heterogeneity underlying the categories of Unemployment and Marginal Attachment in the U.S. In the CPS, Unemployment can be split into

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[15] As noted previously, the countries differ in the specified time period – expecting recall within 6 months or at a specified date in the U.S., versus expecting recall within 12 months in Canada.

[16] Hall and Schulhofer-Wohl (2015) conducted a related analysis of job-finding rates and matching efficiency with heterogeneous jobseekers, with 15 labor market states including substantial subdivision of the unemployed. They did not, however, make use of a reported desire for work among those conventionally treated as out of the labor force.

individuals on temporary layoff (with the provisions that the recall be either within 6 months or be at a specified date), and the much larger group of individuals with recorded (active) job search. The temporary layoff group has substantially higher rates of moving into employment than active searchers and correspondingly lower rates of moving into each of the three non-employment states. Note that since the 1994 CPS revisions there is no longer a future job start category in the CPS in the sense that, even if an individual has a job to start soon, job search remains a requirement to be counted as unemployed.

Table 5 also shows some limited heterogeneity within the Marginal Attachment Group. As noted, in many countries particular attention has been paid to "discouraged workers," a subset of the non-employed who, while wanting work, are recorded as not searching for economic reasons (such as "believes no work available"). Our past research for Canada based on transition methods has queried whether this particular attention is warranted, and the U.S. results in Table 5 are broadly consistent with this earlier work. The mean transition rate of discouraged workers into E is very similar to that for the Marginally Attached as a whole and the complement of the discouraged worker subgroup, so it is hard to conclude that there is much distinctive about this subset. The one difference worthy of comment is that the pMU transition rate is higher for the discouraged, offset by a lower value of pMN. Relative to other Marginally Attached workers, discouraged workers are more likely to start or re-start job search and less likely to exit the labor force.

Table 6 reports mean monthly hazards for subsets of U, M and N based on LFS data for the 1997-2015 sample period. The top panel includes three sub-groups of those conventionally classified as Unemployed: job searchers, temporary layoffs and short-term future job starts. As was the case for the U.S., those on temporary layoff are much more likely – more than twice as likely -- to be employed in the following month than job searchers. Similarly, the 1-month hazards into employment of those who report that they have a job to start within the next month is dramatically higher – more than triple -- that for job searchers. The fact that about 75% of this "short-term future job starts" group is employed in the following month raises serious questions about why, in the absence of job search, these individuals are now classified as non-participants in the U.S.

Within the Marginally Attached category, we follow our previous Canadian research and divide these into four groups according to their reported reasons for not searching for work: (i) Waiting (includes those waiting for replies from employers or recall to a former job); Personal (includes "Own illness or disability", "Caring for own children or elderly relative"; "Other personal or family responsibilities" and "Going to school"; (iii) Discouraged (those who believe no work is available); and (iv) Other. We also report mean transition rates for the Non-waiting subgroup (i.e. Personal + Discouraged + Other).

Several results are noteworthy. The Waiting group stands out as having the highest probability of being employed in the following month, and the lowest likelihood of exiting the workforce into Non-Attachment. In addition, the Discouraged category does not stand out as being strongly attached to the labor force. This group has the lowest transition rate into Employment, and exhibits the highest likelihood of remaining Marginally Attached. The Personal category also exhibits a relatively low attachment to the workforce and the highest likelihood of entering non-attachment, pMN.

It is difficult to compare the behavior of the M subgroups in Canada and the U.S. because of differences in responses to the question about reasons for not searching. However, one broadly similar finding is that the discouraged worker category does not stand out as having a strong labor force attachment in a behavioral sense. However, Canada – U.S. differences are evident in the behavior of this group. In the U.S., discouraged workers have transitions rates into employment pME that are similar to other sub-categories of marginally attached, whereas in Canada discouraged workers have the lowest pME hazard of any sub-category. In addition, U.S. discouraged workers have a lower likelihood of becoming non-attached and a higher probability of starting or resuming job search (pMU), whereas in Canada discouraged workers are more likely to remain marginally attached.

The bottom panel of Table 6 reports transition rates for two sub-groups of the non-attached: long–term future job starts (those who report that they have a job to start, but not within the time period specified for being classified as "short-term future job starts" and Other non-attached. There is clearly a dramatic difference in labor market behavior between these two sub-groups. In terms of the likelihood of

being employed in the following month (pNE), the long-term future job starts group exceed even unemployed job searchers (pUE). They also have a high probability of entering Unemployment in the following month. In a behavioral sense, this group warrants being classified as Unemployed rather than as Non-participants.

6. Conclusion

Unemployment and labor force participation are core concepts used for the measurement of labor force activity. Yet the distinction between unemployment and non-participation remains murky and controversial. In this paper we examine the potential role of an additional labor force state—the marginally attached—that lies between unemployment and out-of-the-labor force. Based on a behavioral or evidence-based approach to the analysis of labor force activity, we provide evidence for both Canada and the U.S. that marginal attachment represents a distinct labor force state with behavior that lies between those conventionally classified as unemployed and the non-attached – those conventionally classified as non-participants less the marginally attached. Our evidence indicates that in both Canada and the U.S. the response to questions about the desire for work among those who did not recently search for work provides an appropriate way to distinguish between the marginally attached and non-attached.

We begin by providing evidence on the importance of the margin between unemployment and non-participation to movements in the aggregate unemployment rate. To do so we present two comparative decompositions. First, we attribute movements in unemployment to three components: changes in labor force participation, changes in non-employment, and changes in the labor force attachment of the non-employed. We conclude that changes in P(U|NE), the fraction of the non-employed that is unemployed, have played a major role in the direction and magnitudes of changes in the aggregate unemployment rate in both countries over this 35-year period. Similarly, Canada – U.S. differences in P(U|NE) have been the most important factor contributing to relative changes in unemployment. Second, we decompose movements of unemployment in another way, one consistent with the four state model that addresses marginal attachment to the labor force. In this complementary breakdown, changes in unemployment are attributed to: changes in labor force participation, changes in the desire for work,

and changes in the proportion of those desiring work who are engaged in job search (and hence are counted as unemployed). The main result, for both Canada and the U.S., is that changes in the desire for work are a major factor in accounting for the evolution of the unemployment rate. In contrast, changes in $P(U|W)$ play only a secondary role in driving these unemployment rate changes. These results are consistent with the margin between wanting work and not wanting work being more important than the margin between search and non-search and illustrate the additional insight that can be drawn from explicit study of the marginally attached. These complementary decompositions of movements in unemployment highlight the heterogeneous nature of the non-employed and the potential value in taking into account an expressed desire for work rather than relying principally on reported job search.

Given the importance of both the non-employment margin and the unemployment/desire for work margin in these aggregate data, we then turn attention to microdata where we can identify and compare the behaviors of those on these margins. We conduct this analysis by linking respondents across subsequent months of the Canadian LFS and U.S. CPS, using the rotation group features of the two surveys. Doing so allows us to determine whether the non-employment states—unemployment (U), marginal attachment (M) and non-attachment (N)—represent distinct labor force states in terms of their subsequent transitions into destination states employment E, and non-employment states U, M and N. Extending our earlier research for Canada to the U.S. and updating our Canadian research to cover a substantially longer time period, we find that in both countries U, M and N are behaviorally distinct labor force states. One implication of these results is that a measurement framework with three non-employment states— which is readily feasible with available data—provides a richer and more accurate way of monitoring and analysing labor market behavior than the present system based on two non-employment states.

We also examine subsets of the unemployed, marginally attached and non-attached. Canada and the U.S. classify some of these sub-groups in the same way, and treat others differently. Discouraged workers – those who report that they want work but did not search because they believed no work was available – often receive

considerable policy and public attention. However, we find that this group does not exhibit behavior that stands out relative to other marginally attached individuals. There are, however, some interesting differences between the two countries in the behavior of discouraged workers. In contrast, Canadian data show that those not searching but who report that they have a job to start in the future (both short-term starts, with a new job so start within a month, and long-term starts, with a new job at a definite date more than a month in the future) display very strong attachment to the labor force – even more than do those conventionally classified as unemployed. On these grounds, this group warrants consideration for being included among the unemployed. Although the lack of U.S. data on this group precludes comparative analysis of whether the same conclusion would hold in the U.S. economy, the strong attachment of this group evident in Canadian data suggests that identifying 'future job starts' in the U.S. CPS would be worthwhile. In addition, our results strongly support the current practice in both countries of including among the unemployed non-searchers who report that they are on temporary layoff from their current employer.

There are two potential limitations of this analysis that we should comment on. First, we assume that the underlying statistical framework is Markovian and that labor market spells shorter than one month are neglected in the analysis. The stationary Markov assumption—that transition rates only depend on the current state (E, U, M, N) and not, for example, on the length of time already spent in that state—rules out duration dependence in unemployment (e.g., Kroft, Lange & Notowidigdo, 2013; Farber, Silverman and von Wachter, 2015) and related persistence in employment and in other non-employment spells. It also rules out more complicated effects of labor market histories such as those addressed by Kudlyak & Lange (2014). One approach to address this would be to use self-reported interrupted durations to condition on labor market states prior to the CPS or LFS window of observation, although these self-reports ("when did the current search spell start?") are not available for the desire for work question central to our analysis. An alternative would be to try and differentiate between fresh spells (where the start of a period of Marginal Attached is observed, following a prior observation of some other state), and spells that are interrupted (left-censored) at

the start of the CPS/LFS window. A problem is that this could only address short amounts of dependence given the respective 4/6-month panel structures.

Second, we have used the CPS and LFS information on monthly labor force status, both of which refer to status in a specific reference week within the month (although somewhat conditioned on behavior in the previous month, as in the search within the past 4 weeks requirement). We therefore eschew the use of information on short (0-4 weeks) recent spells of unemployment that Shimer (2012) developed and that others have subsequently used (e.g., Campolieti (2011) for Canada). Shimer's method, which relies in its leading form on the assumption that individuals move between employment and unemployment (and neither enter nor exit the labor force), allows the researcher to deduce the observable implications in monthly data of an underlying continuous time model of labor market transitions. However, for the study of a 4-state model as in the present paper, the absence of data for equivalent measures of 0-4 weeks of Marginal Attachment and Nonattachment precludes the extension of Shimer's method to richer analysis of non-employment.

Our research also raises a number of issues that could be addressed in future work. A key finding is that the marginally attached constitute an intermediate state between those classified as unemployed and out-of-the labor force, and that transition rates from U, M and N into various destination states are remarkably similar in the two countries. However, the much larger size of the marginally attached category relative to the unemployed in the U.S. remains a mystery, as do the different trends over the past 35 years in the M/U ratio north and south of the border. Could these differences be related to labor market policies such as unemployment insurance and disability insurance, policies that differ in significant ways in the two countries? Another issue is whether our evidence-based approach can be used to "fine tune" measures of labor force activity and improve comparability across countries. For example, the methods we have employed can directly address the case for inclusion or exclusion of passive job searchers within the ranks of the unemployed, a key difference between Canadian and U.S. definitions that has not been confronted with much evidence to date.

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Table 1a: Sources of Changes in Unemployment, Canada, Annual, 1979-2015

Adult population Time Period	Change in Unemployment (%)	Amount contributed by: P(NE)	P(U|NE)	P(LF)
1979-1989	0.000	-0.084	0.139	-0.055
		n/a	n/a	n/a
1989-2000	-0.098	0.024	-0.144	0.023
		(-24%)	(147%)	(-23%)
2000-2007	-0.125	-0.056	-0.045	-0.024
		(45%)	(36%)	(19%)
2007-2015	0.140	0.056	0.060	0.024
		(40%)	(43%)	(17%)
1979-2015	-0.083	-0.06	0.01	-0.032
		(72%)	(-12%)	(39%)

Table 1b: Sources of Changes in Unemployment, U.S., Annual, 1979-2015

Adult population Time Period	Change in Unemployment (%)	Amount contributed by: P(NE)	P(U|NE)	P(LF)
1979-1989	-0.090	-0.080	0.033	-0.043
		(89%)	(-37%)	(48%)
1989-2000	-0.281	-0.039	-0.234	-0.009
		(14%)	(83%)	(3%)
2000-2007	0.140	0.039	0.085	0.017
		(28%)	(61%)	(12%)
2007-2015	0.142	0.095	-0.005	0.051
		(67%)	(-3%)	(36%)
1979-2015	-0.089	0.015	-0.121	0.016
		(-17%)	(136%)	(-18%)

Table 1c: Sources of Changes in Unemployment, Canada – U.S. Differences, Annual, 1979-2015

Adult population Time Period	Log Relative Change in Unemployment	Amount contributed by: P(NE)	P(U|NE)	P(LF)
1979-1989	0.090	-0.003	0.105	-0.012
		(-4%)	(117%)	(-13%)
1989-2000	0.183	0.062	0.090	0.032
		(34%)	(49%)	(17%)
2000-2007	-0.265	-0.094	-0.130	-0.041
		(36%)	(49%)	(15%)
2007-2015	-0.002	-0.040	0.065	-0.027
		(2092%)	(-3436%)	(1444%)
1979-2015	0.007	-0.075	0.130	-0.048
		(-1071%)	(1857%)	(-686%)

Table 2a: Sources of Changes in Unemployment, Canada, Annual, 1979-2015

Adult population		Amount contributed by:		
Time Period	Change in Unemployment (%)	P(W)	P(U|W)	P(LF)
1979-1989	0.000	0.045	0.010	-0.055
		n/a	n/a	n/a
1989-2000	-0.098	-0.135	0.014	0.023
		(138%)	(-14%)	(-24%)
2000-2007	-0.125	-0.080	-0.021	-0.024
		(64%)	(17%)	(19%)
2007-2015	0.140	0.093	0.023	0.024
		(64%)	(17%)	(19%)
1979-2015	-0.083	-0.077	0.026	-0.032
		(93%)	(-31%)	(39%)

Table 2b: Sources of Changes in Unemployment, U.S., Annual, 1979-2015

Adult population		Amount contributed by:		
Time Period	Change in Unemployment (%)	P(W)	P(U|W)	P(LF)
1979-1989	-0.090	-0.100	0.053	-0.043
		(111%)	(-59%)	(48%)
1989-2000	-0.281	-0.300	0.028	-0.009
		(107%)	(-10%)	(3%)
2000-2007	0.140	0.058	0.065	0.017
		(41%)	(46%)	(12%)
2007-2015	0.142	0.120	-0.030	0.051
		(85%)	(-21%)	(36%)
1979-2015	-0.089	-0.222	0.116	0.016
		(247%)	(-129%)	(-18%)

Table 2c: Sources of Changes in Unemployment, Canada – U.S. Differences, Annual, 1979-2015

Adult population Time Period	Log Relative Change in Unemployment	Amount contributed by: P(W)	P(U|W)	P(LF)
1979-1989	0.090	0.145	-0.043	-0.012
		(161%)	(-48%)	(-13%)
1989-2000	0.183	0.165	-0.014	0.032
		(90%)	(-8%)	(18%)
2000-2007	-0.265	-0.138	-0.086	-0.041
		(52%)	(33%)	(16%)
2007-2015	-0.002	-0.027	0.053	-0.027
		(1350%)	(-2650%)	(1400%)
1979-2015	0.007	0.145	-0.090	-0.048
		(2071%)	(-1286%)	(-686%)

Table 3: Average Transition Rates, U.S.A, 1994 – 2015

1-Month	Transition to:			
Transitions from:	**Employment**	**Unemployment**	**Marginal Attachment**	**Nonattachment**
Unemployment	0.243	0.518	0.092	0.147
	(0.003)	(0.004)	(0.001)	(0.001)
Marginal Attachment	0.119	0.167	0.277	0.437
	(0.002)	(0.002)	(0.002)	(0.002)
Nonattachment	0.037	0.015	0.024	0.923
	(0.000)	(0.000)	(0.000)	(0.001)
2-Month	Transition to:			
Transitions from:	**Employment**	**Unemployment**	**Marginal Attachment**	**Nonattachment**
Unemployment	0.324	0.416	0.089	0.171
	(0.004)	(0.005)	(0.001)	(0.001)
Marginal Attachment	0.158	0.157	0.218	0.466
	(0.002)	(0.002)	(0.002)	(0.002)
Nonattachment	0.050	0.017	0.025	0.908
	(0.001)	(0.000)	(0.000)	(0.001)
3-Month	Transition to:			
Transitions from:	**Employment**	**Unemployment**	**Marginal Attachment**	**Nonattachment**
Unemployment	0.324	0.425	0.088	0.163
	(0.004)	(0.005)	(0.001)	(0.002)
Marginal Attachment	0.166	0.163	0.233	0.439
	(0.002)	(0.002)	(0.002)	(0.002)
Nonattachment	0.050	0.017	0.025	0.908
	(0.001)	(0.000)	(0.000)	(0.001)

Table 4: Average Transition Rates, Canada, 1997 – 2015

1-Month

Transitions from:	Transition to: Employment	Unemployment	Marginal Attachment	Nonattachment
Unemployment	0.234	0.576	0.060	0.129
	(0.006)	(0.007)	(0.004)	(0.005)
Marginal Attachment	0.108	0.200	0.283	0.409
	(0.008)	(0.011)	(0.012)	(0.013)
Nonattachment	0.034	0.022	0.018	0.925
	(0.001)	(0.001)	(0.001)	(0.001)

2-Month

Transitions from:	Transition to: Employment	Unemployment	Marginal Attachment	Nonattachment
Unemployment	0.327	0.461	0.058	0.155
	(0.009)	(0.009)	(0.004)	(0.006)
Marginal Attachment	0.163	0.202	0.229	0.407
	(0.010)	(0.011)	(0.012)	(0.013)
Nonattachment	0.051	0.026	0.018	0.906
	(0.001)	(0.001)	(0.001)	(0.002)

3-Month

Transitions from:	Transition to: Employment	Unemployment	Marginal Attachment	Nonattachment
Unemployment	0.383	0.394	0.055	0.167
	(0.010)	(0.01)	(0.005)	(0.007)
Marginal Attachment	0.201	0.196	0.197	0.406
	(0.013)	(0.013)	(0.013)	(0.017)
Nonattachment	0.063	0.027	0.017	0.893
	(0.002)	(0.001)	(0.001)	(0.002)

4-Month	Transition to:			
Transitions from:	**Employment**	**Unemployment**	**Marginal Attachment**	**Nonattachment**
Unemployment	0.422	0.348	0.054	0.176
	(0.013)	(0.012)	(0.006)	(0.010)
Marginal Attachment	0.231	0.192	0.175	0.403
	(0.017)	(0.015)	(0.014)	(0.020)
Nonattachment	0.072	0.028	0.017	0.883
	(0.002)	(0.001)	(0.001)	(0.002)

5-Month	Transition to:			
Transitions from:	**Employment**	**Unemployment**	**Marginal Attachment**	**Nonattachment**
Unemployment	0.451	0.313	0.053	0.183
	(0.018)	(0.017)	(0.008)	(0.014)
Marginal Attachment	0.250	0.189	0.153	0.408
	(0.023)	(0.022)	(0.020)	(0.026)
Nonattachment	0.080	0.029	0.017	0.874
	(0.004)	(0.002)	(0.002)	(0.004)

Table 5: Average Transition Rates for Sub-groups of Unemployed and Marginally Attached, U.S.A, 1994-2015

1-Month from Unemployment and subgroups
Transitions from:

Transition to:

	Employment	Unemployment	Marginal Attachment	Nonattachment
Unemployment (overall)	0.243	0.518	0.092	0.147
	(0.003)	(0.004)	(0.001)	(0.001)
Temporary Layoffs	0.477	0.389	0.041	0.092
	(0.005)	(0.005)	(0.001)	(0.002)
Active Searchers	0.211	0.535	0.099	0.155
	(0.003)	(0.004)	(0.001)	(0.001)

1-Month from Marginal Attachment and subgroups
Transitions from:

Transition to:

	Employment	Unemployment	Marginal Attachment	Nonattachment
Marginal Attachment (overall)	0.119	0.167	0.277	0.437
	(0.002)	(0.002)	(0.002)	(0.002)
Discouraged workers	0.125	0.269	0.288	0.318
	(0.003)	(0.003)	(0.003)	(0.004)
Other	0.118	0.156	0.275	0.450
	(0.002)	(0.001)	(0.002)	(0.002)

Table 6: Average Transition Rates for Sub-groups of Unemployed, Marginally Attached and Non Attached, Canada, 1997-2015

1-Month from Unemployment and subgroups

Transition to:

Transitions from:	Employment	Unemployment	Marginal Attachment	Nonattachment
Unemployment (overall)	0.234	0.576	0.060	0.129
	(0.006)	(0.007)	(0.004)	(0.005)
Temporary Layoffs	0.453	0.429	0.045	0.074
	(0.026)	(0.026)	(0.011)	(0.013)
Job Searchers	0.193	0.609	0.063	0.135
	(0.006)	(0.008)	(0.004)	(0.006)
Future Job Starts	0.736	0.140	0.030	0.094
	(0.036)	(0.029)	(0.014)	(0.023)

1-Month from Marginal Attachment and subgroups

Transition to:

Transitions from:	Employment	Unemployment	Marginal Attachment	Nonattachment
Marginal Attachment (overall)	0.108	0.200	0.283	0.409
	(0.008)	(0.011)	(0.012)	(0.013)
Waiting	0.277	0.264	0.309	0.149
	(0.025)	(0.025)	(0.026)	(0.021)
Personal	0.095	0.175	0.295	0.436
	(0.011)	(0.015)	(0.018)	(0.019)
Discouraged	0.069	0.223	0.417	0.290
	(0.014)	(0.022)	(0.026)	(0.024)
Other Marginally Attached	0.111	0.249	0.295	0.344
	(0.022)	(0.030)	(0.031)	(0.034)
NonWaiting (=Personal+Discouraged + Other)	0.092	0.201	0.325	0.382
	(0.008)	(0.011)	(0.013)	(0.014)

1-Month from Non Attachment and subgroups	Transition to:			
Transitions from:	**Employment**	**Unemployment**	**Marginal Attachment**	**Nonattachment**
Non Attachment (overall)	0.034	0.022	0.018	0.925
	(0.001)	(0.001)	(0.001)	(0.001)
Long-term Future Job Starts	0.259	0.245	0.046	0.451
	(0.031)	(0.030)	(0.014)	(0.035)
Other Non Attached	0.032	0.021	0.013	0.935
	(0.001)	(0.001)	(0.001)	(0.002)

Fig 0: Ratio of Marginally Attached to Unemployed
1976-2015
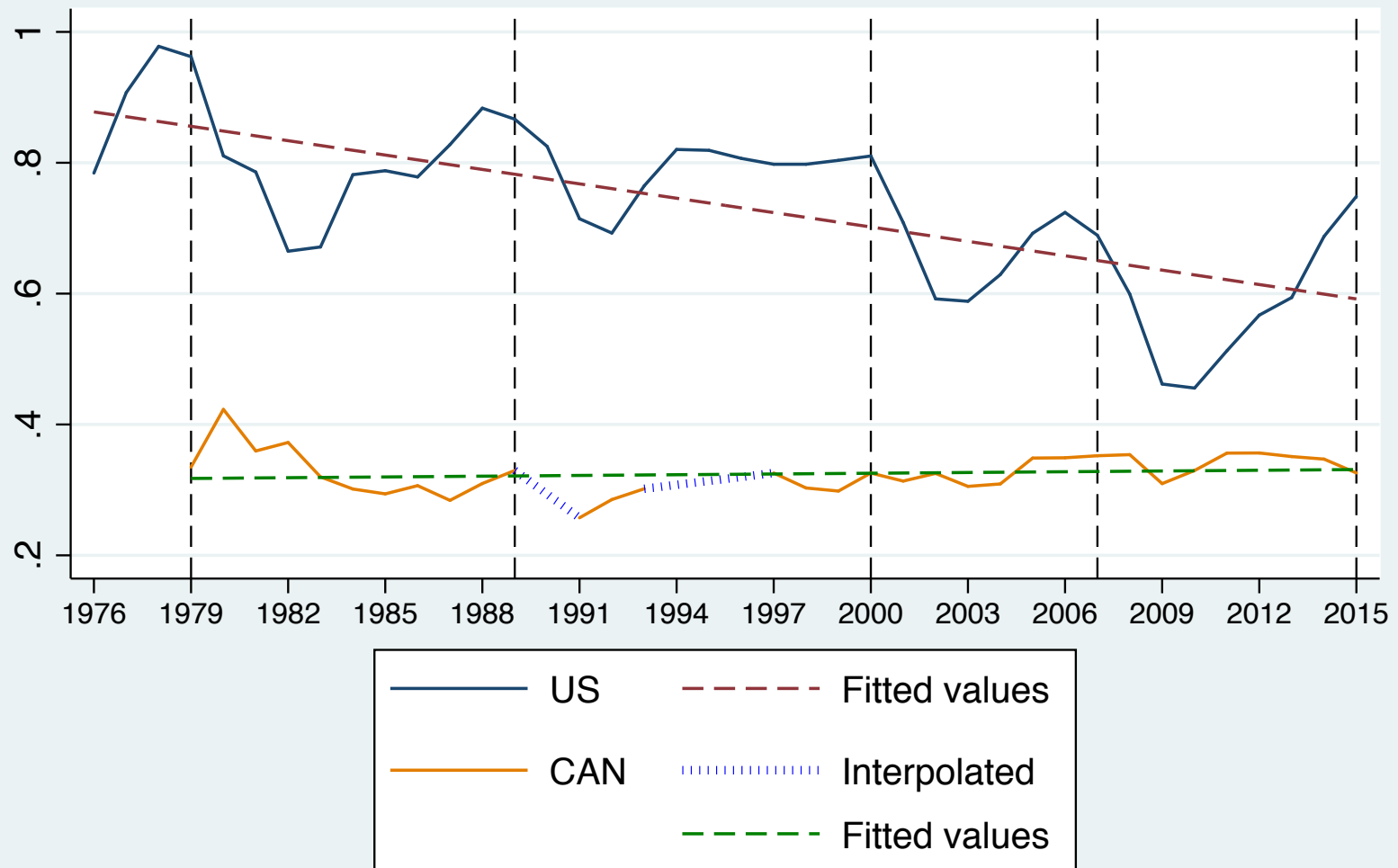
Fig 1: Nonemployment Rate US and Canada
1976-2015
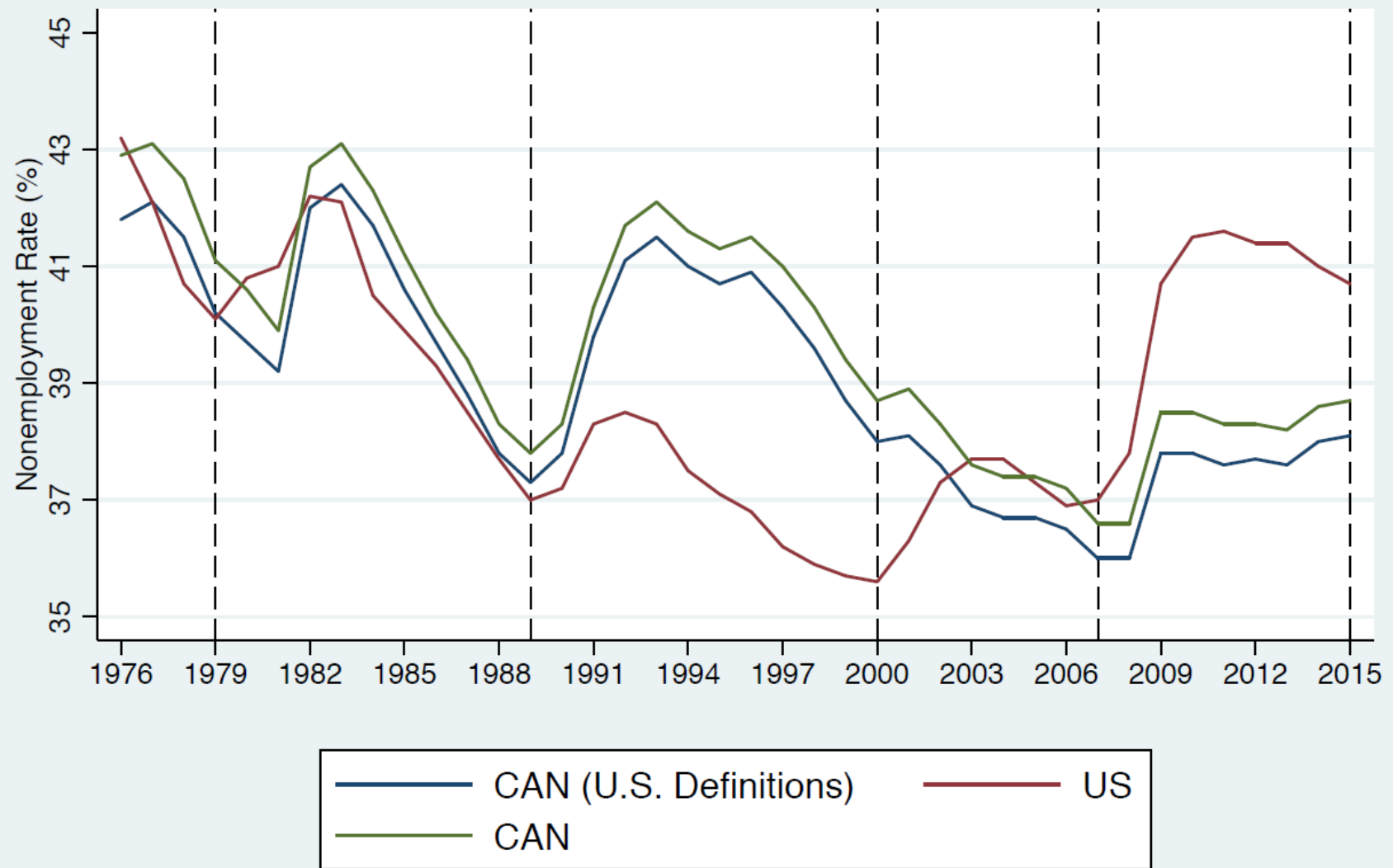
Fig 2: Participation Rate US and Canada
1976-2015
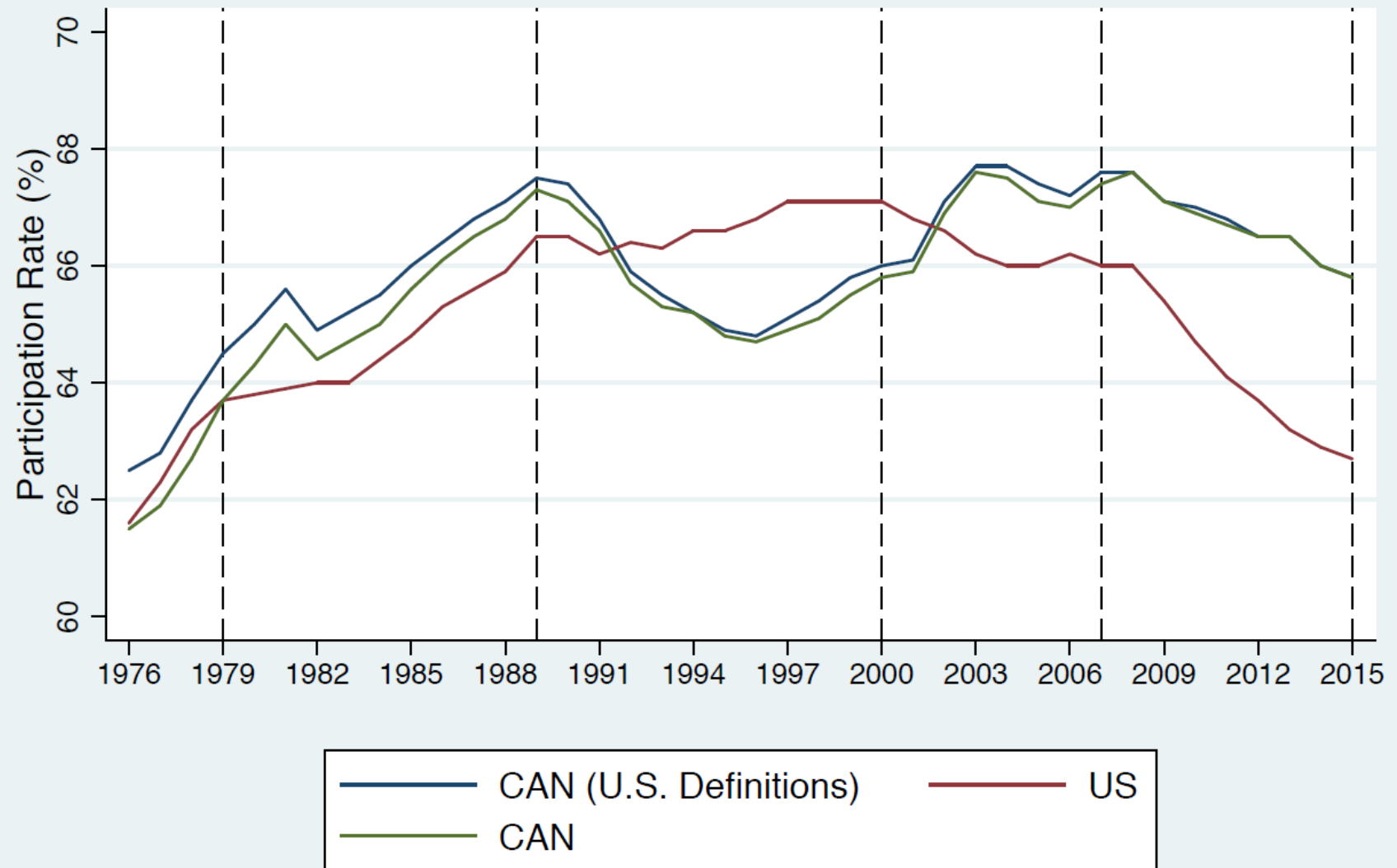
Fig 3: Probability Unemployed Given Nonemployed US and Canada 1976-2015
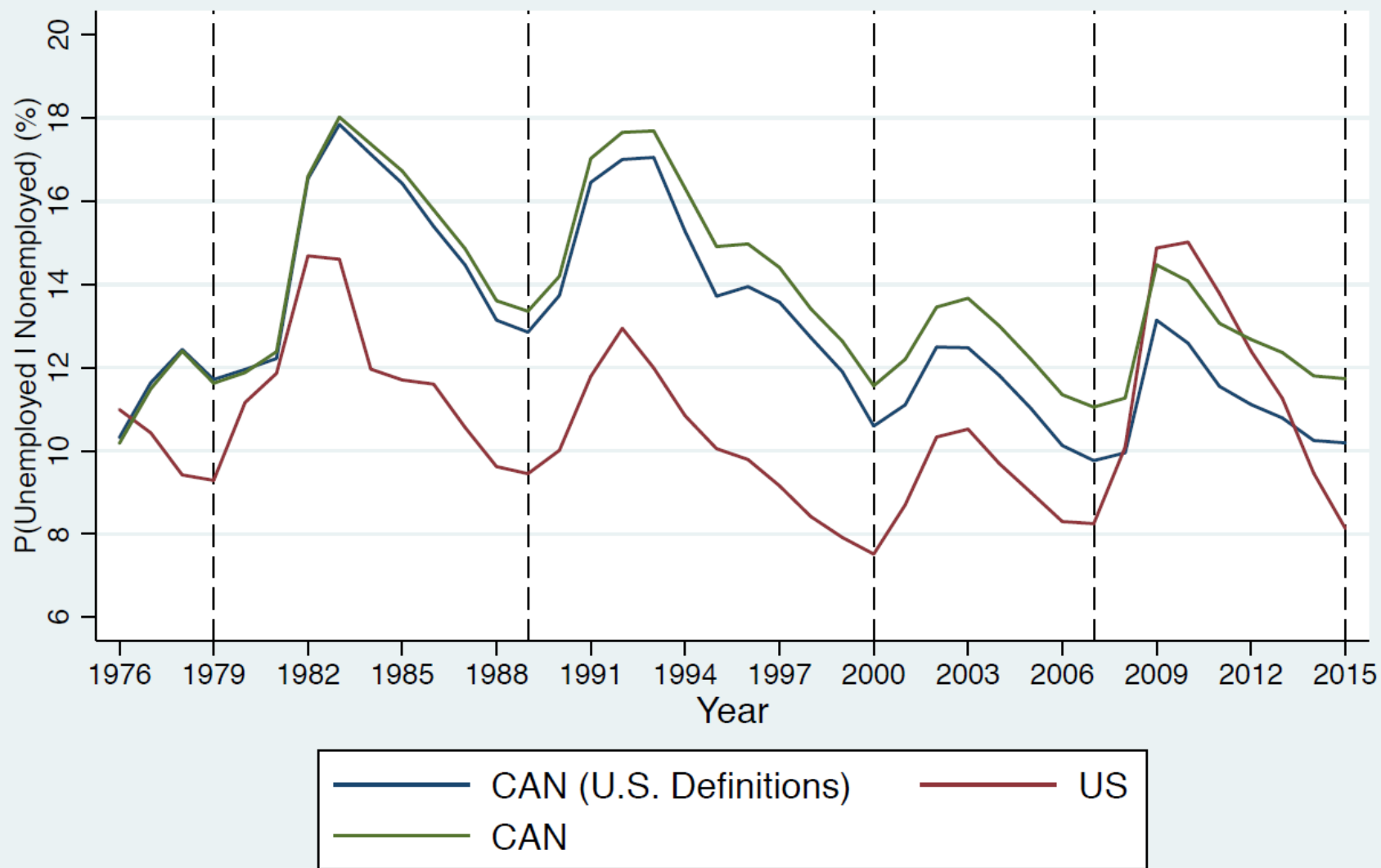
Fig 4: 'Want Work' Rate US and Canada
1979-2015
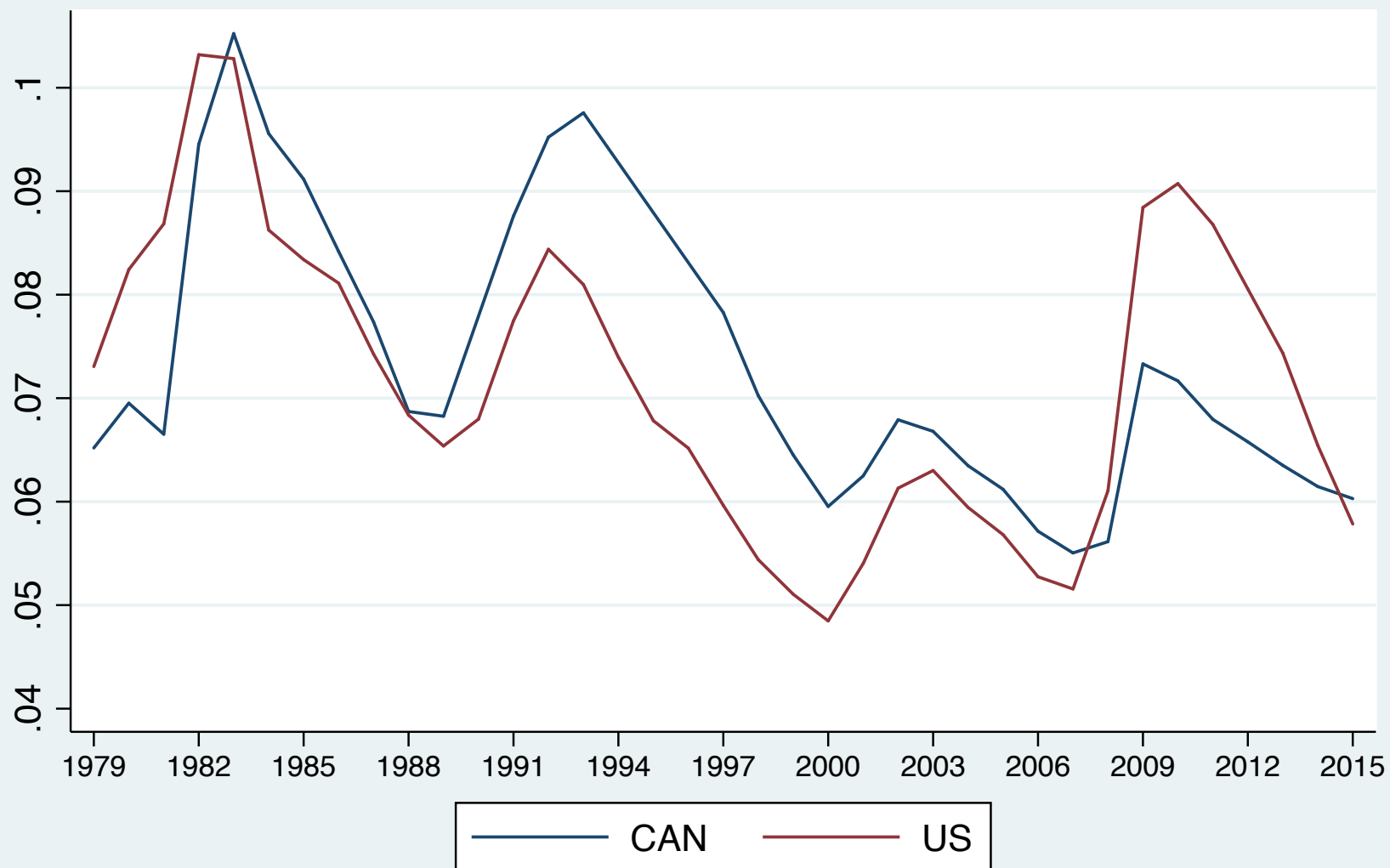
Fig 5: Probability Unemployed Given Want Work US and Canada
1979-2015
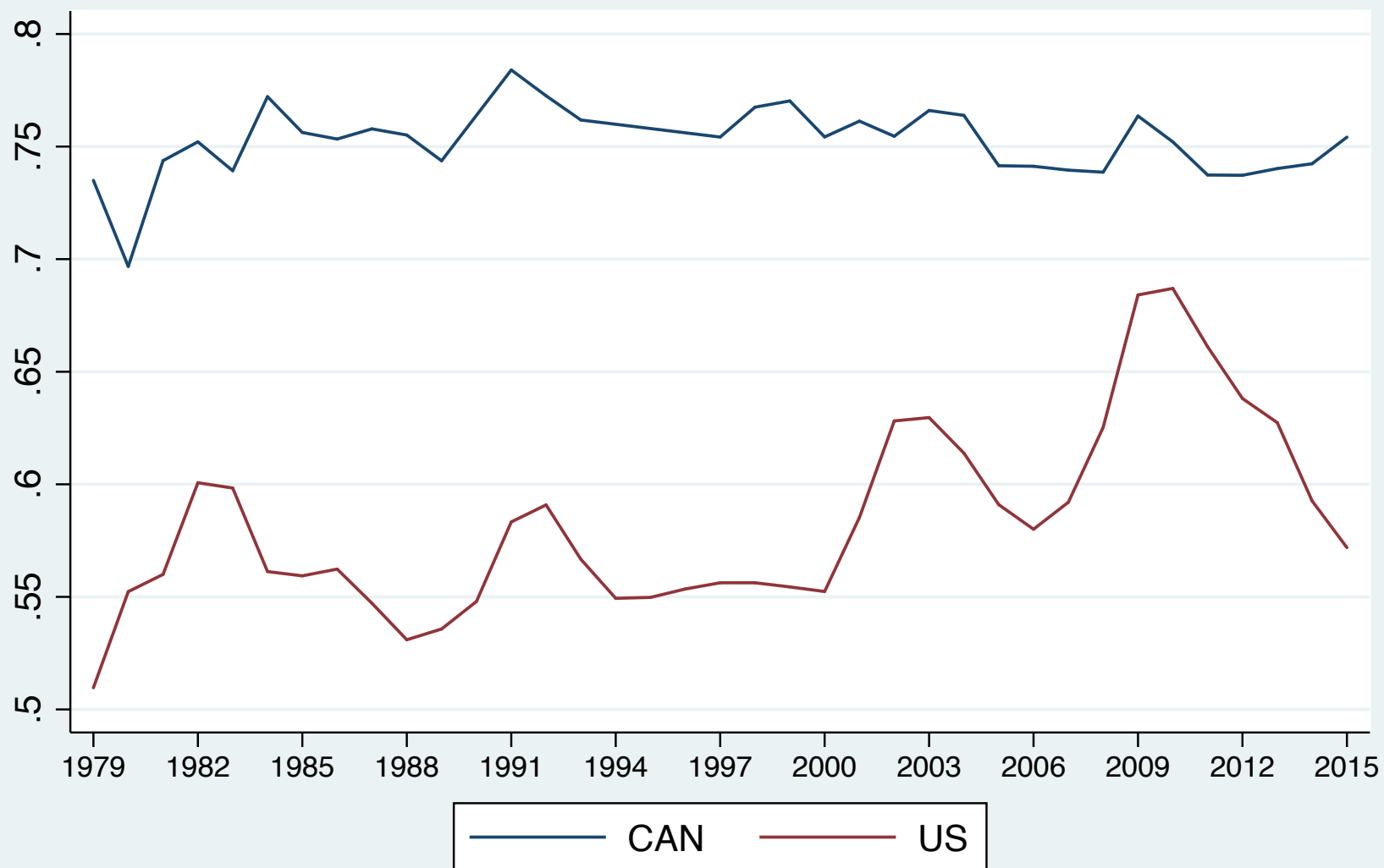
US1: Transition Rates into Employment
1994-2015
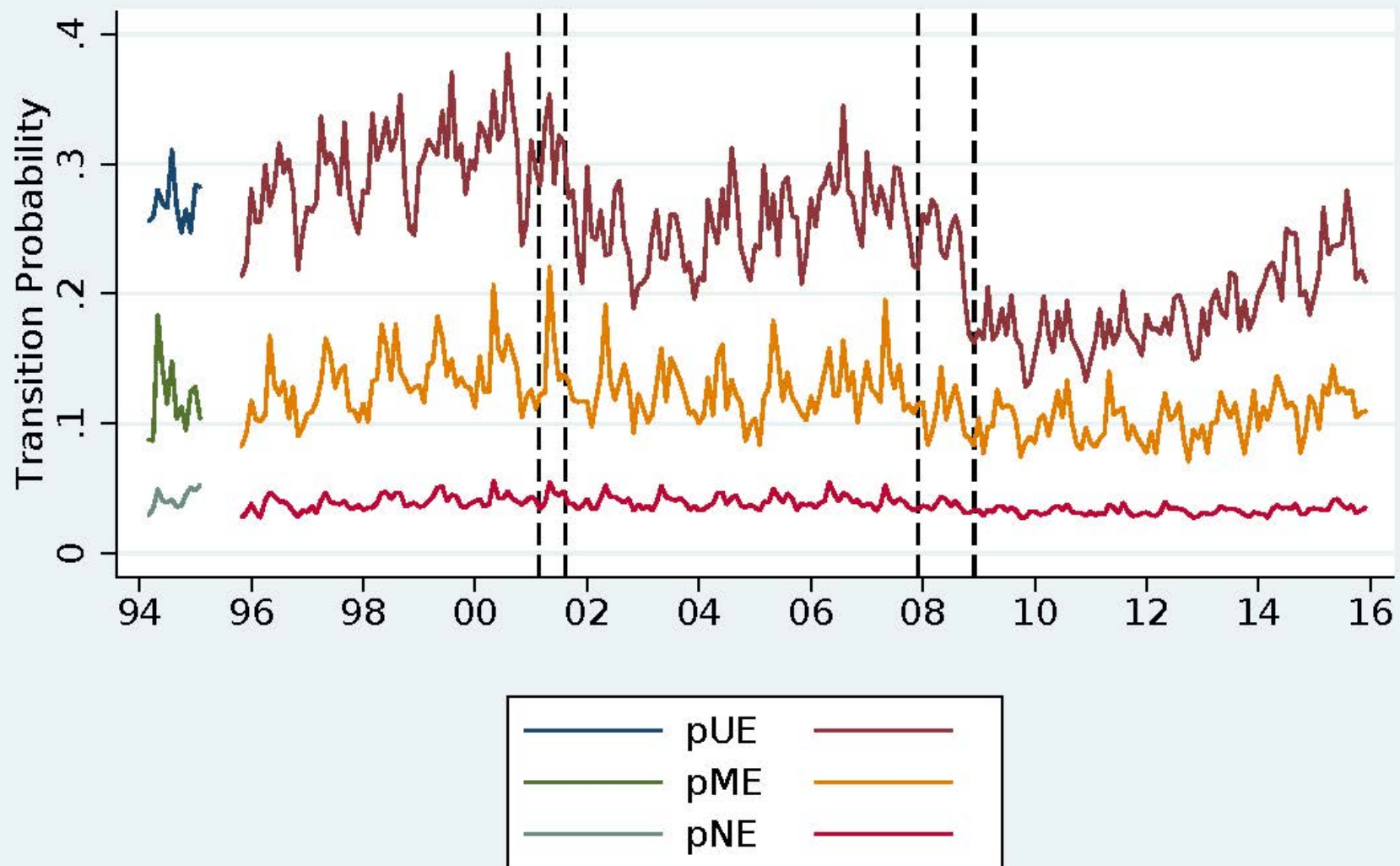
CAN1: Transition Rates into Employment
1997-2015
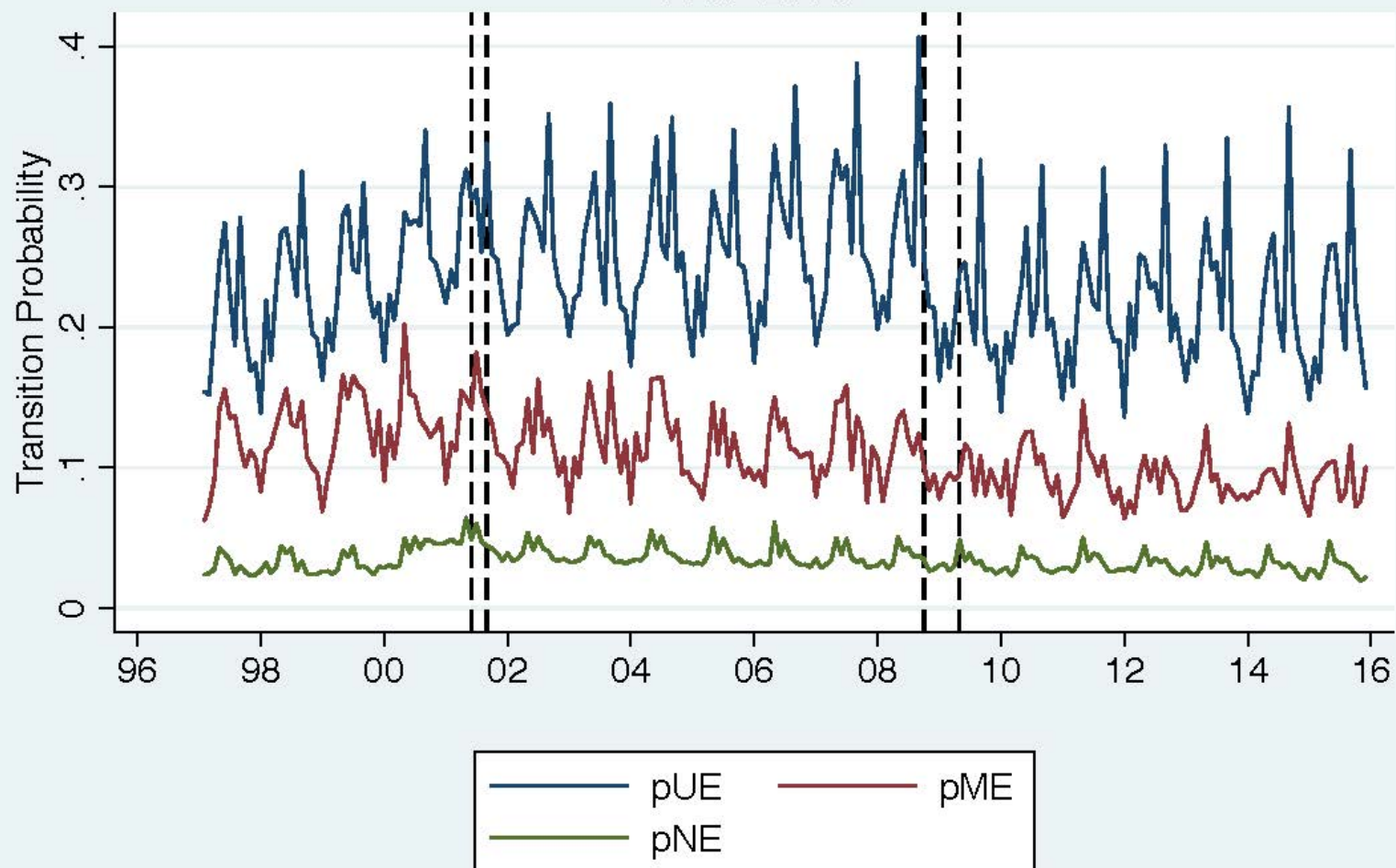
US2: Transition Rates into Unemployment
1994-2015
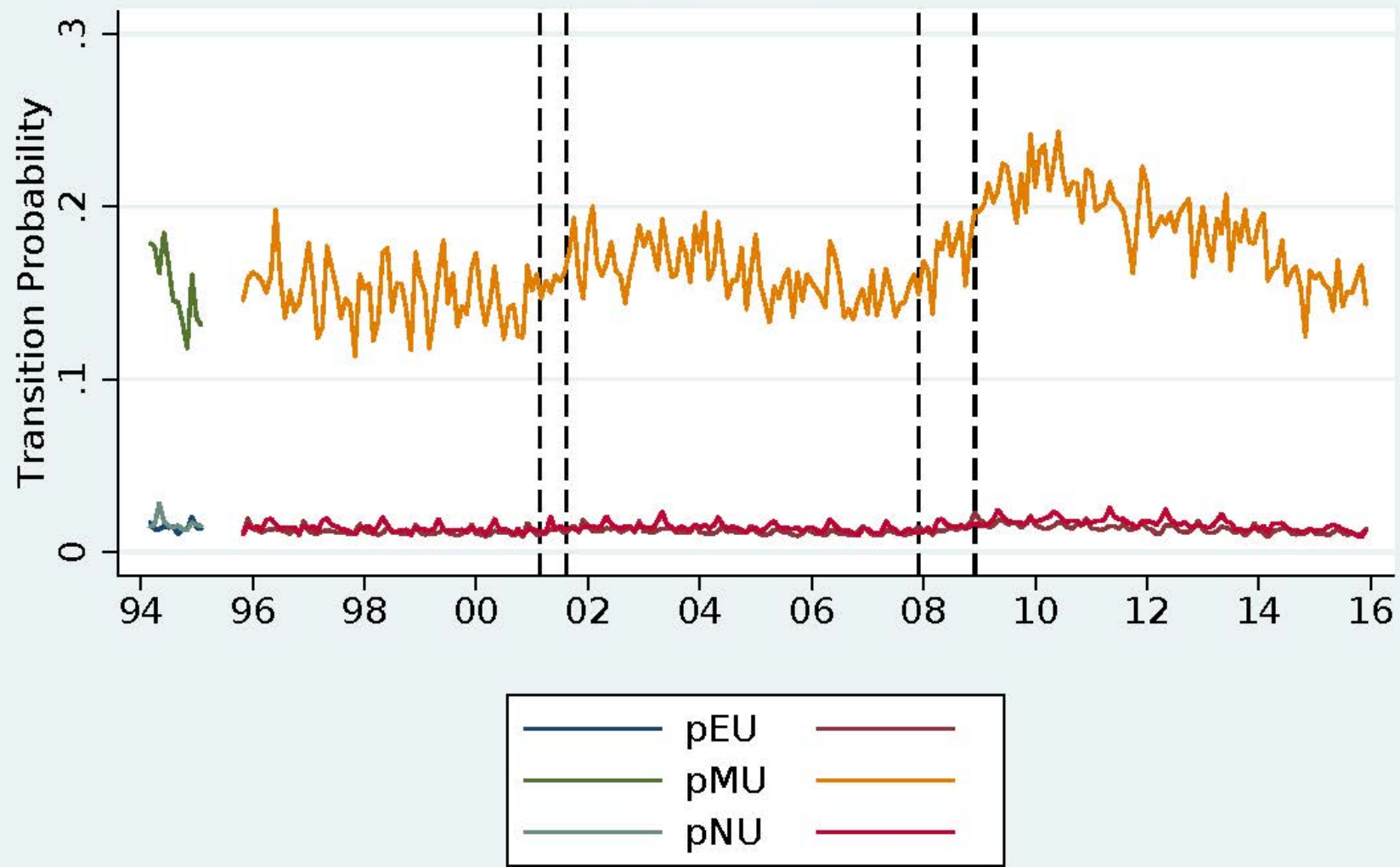
CAN2: Transition Rates into Unemployment
1997-2015
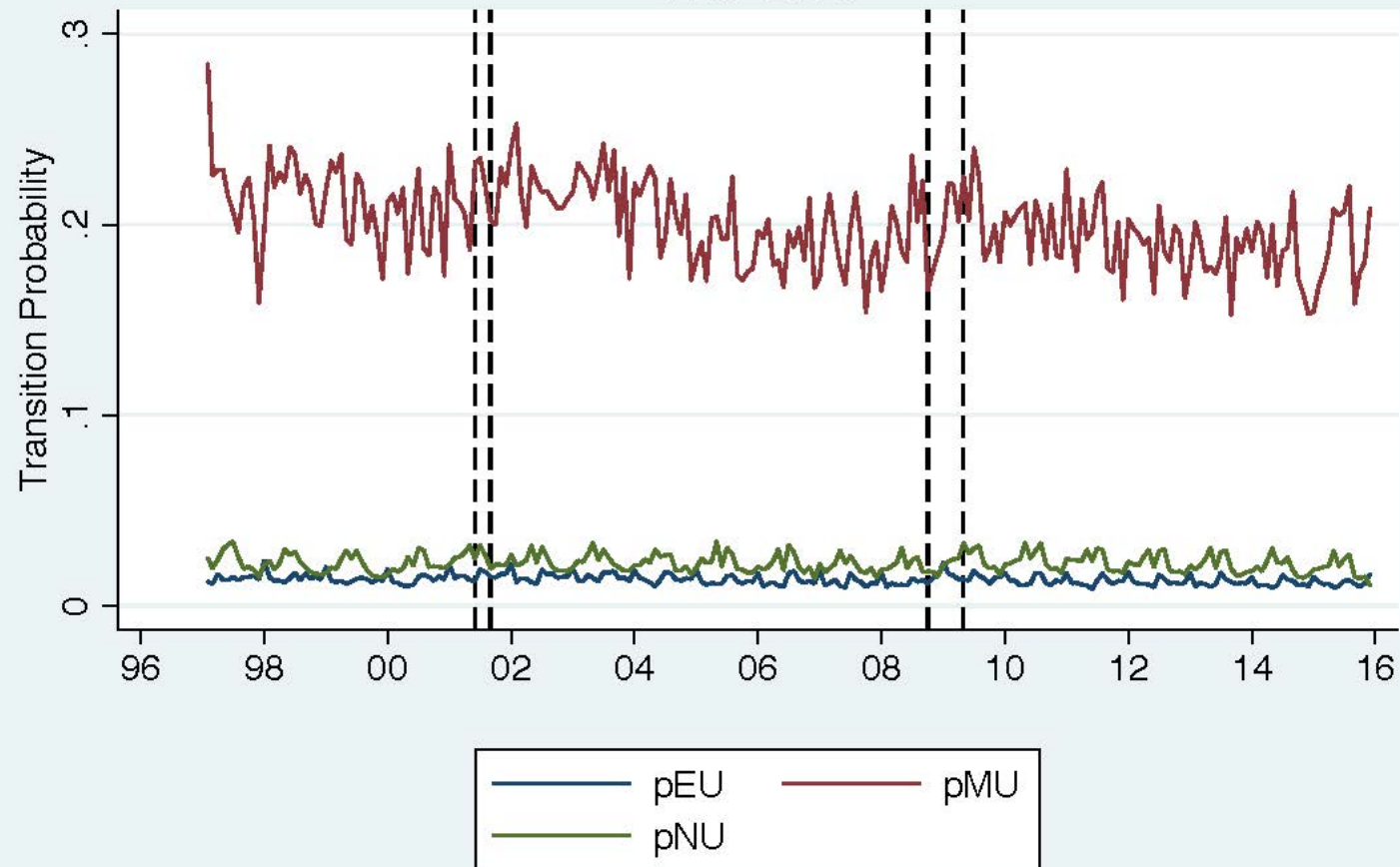
US3:Transition Rates into Marginal Attachment
1994-2015

Legend:
pEM
pUM
pNM
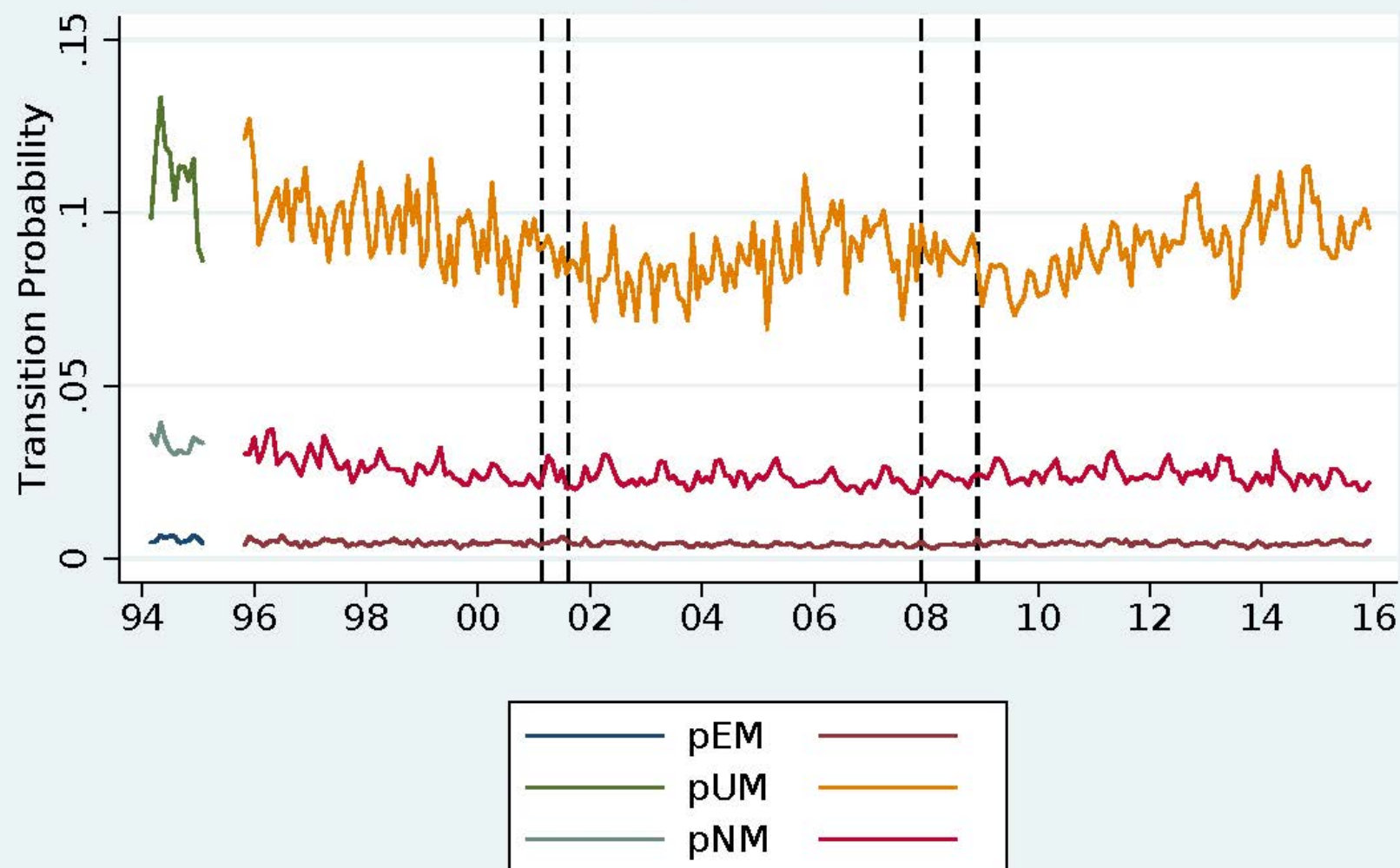
CAN3: Transition Rates into Marginal Attachment
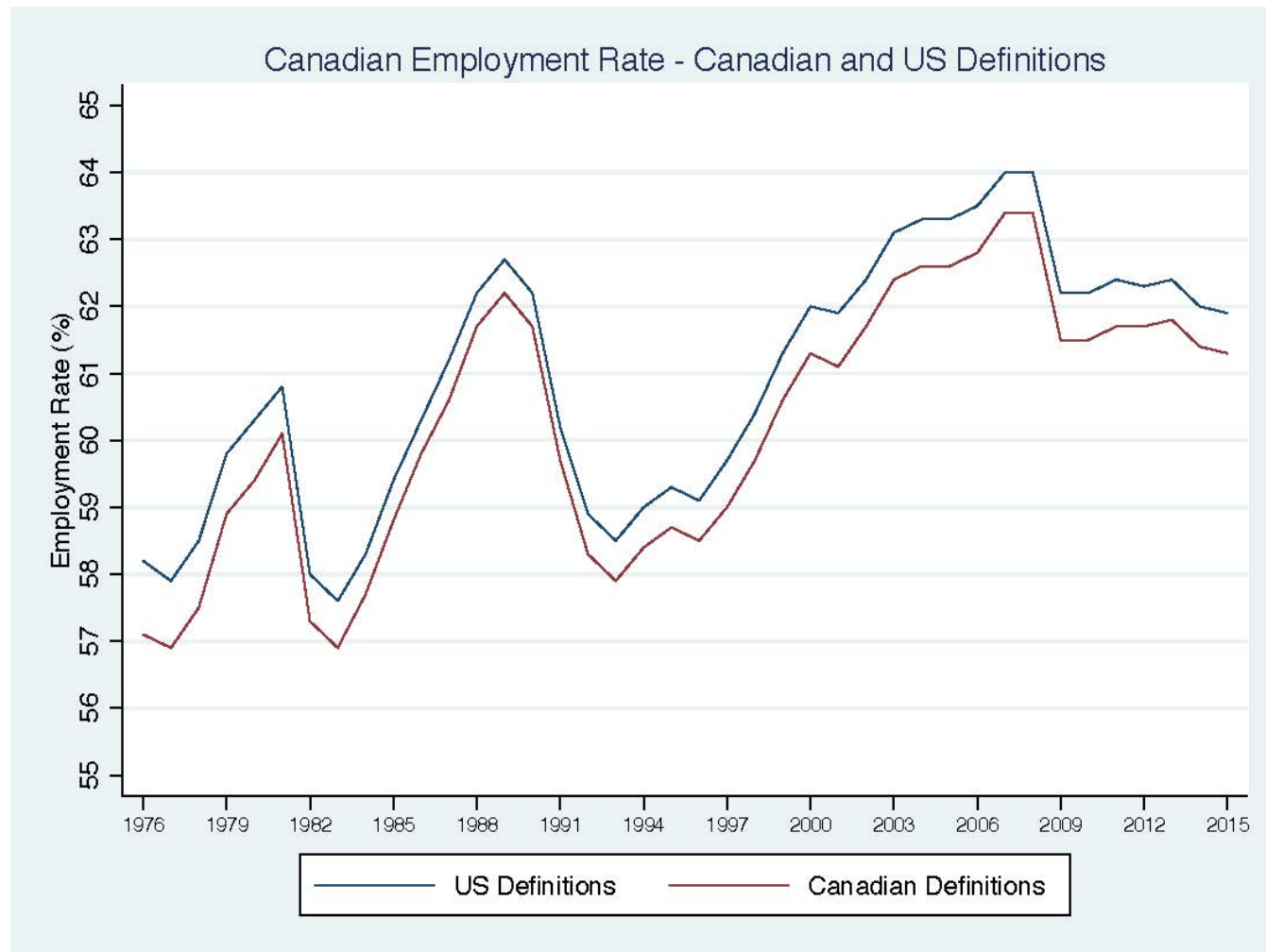1997-2015
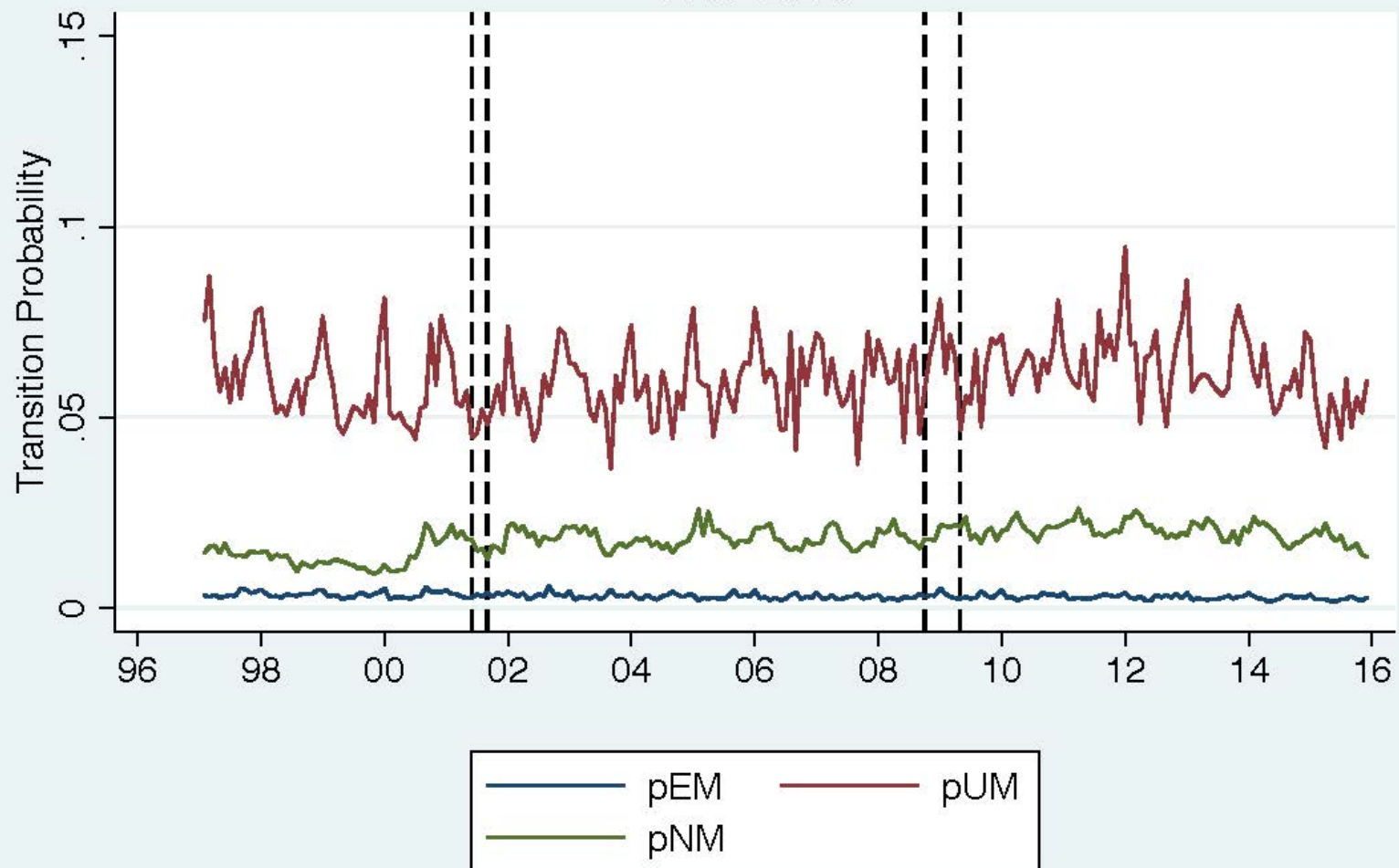
US4: Transition Rates into Non-Attachment
1994-2015
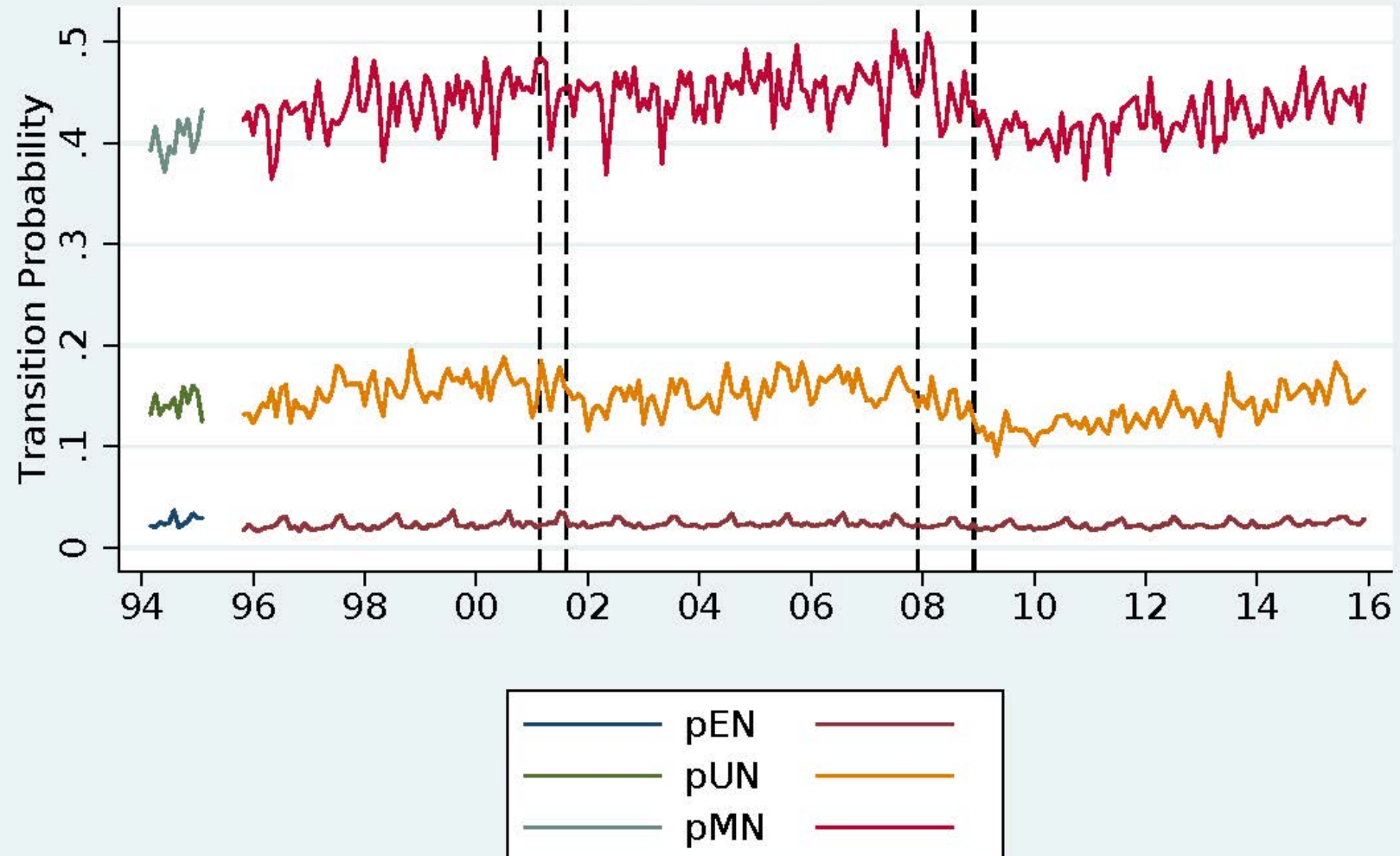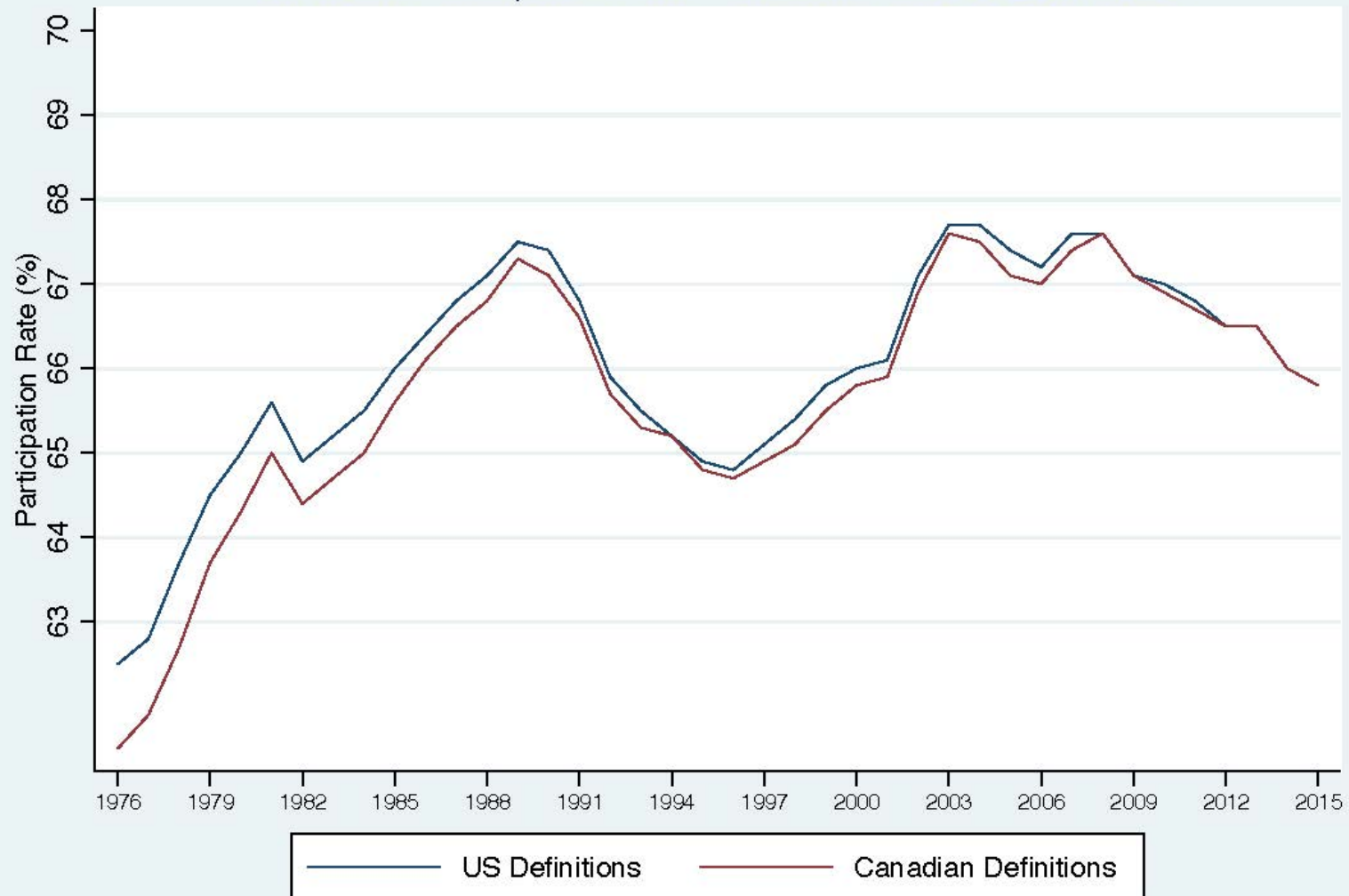
CAN4: Transition Rates into Non-Attachment
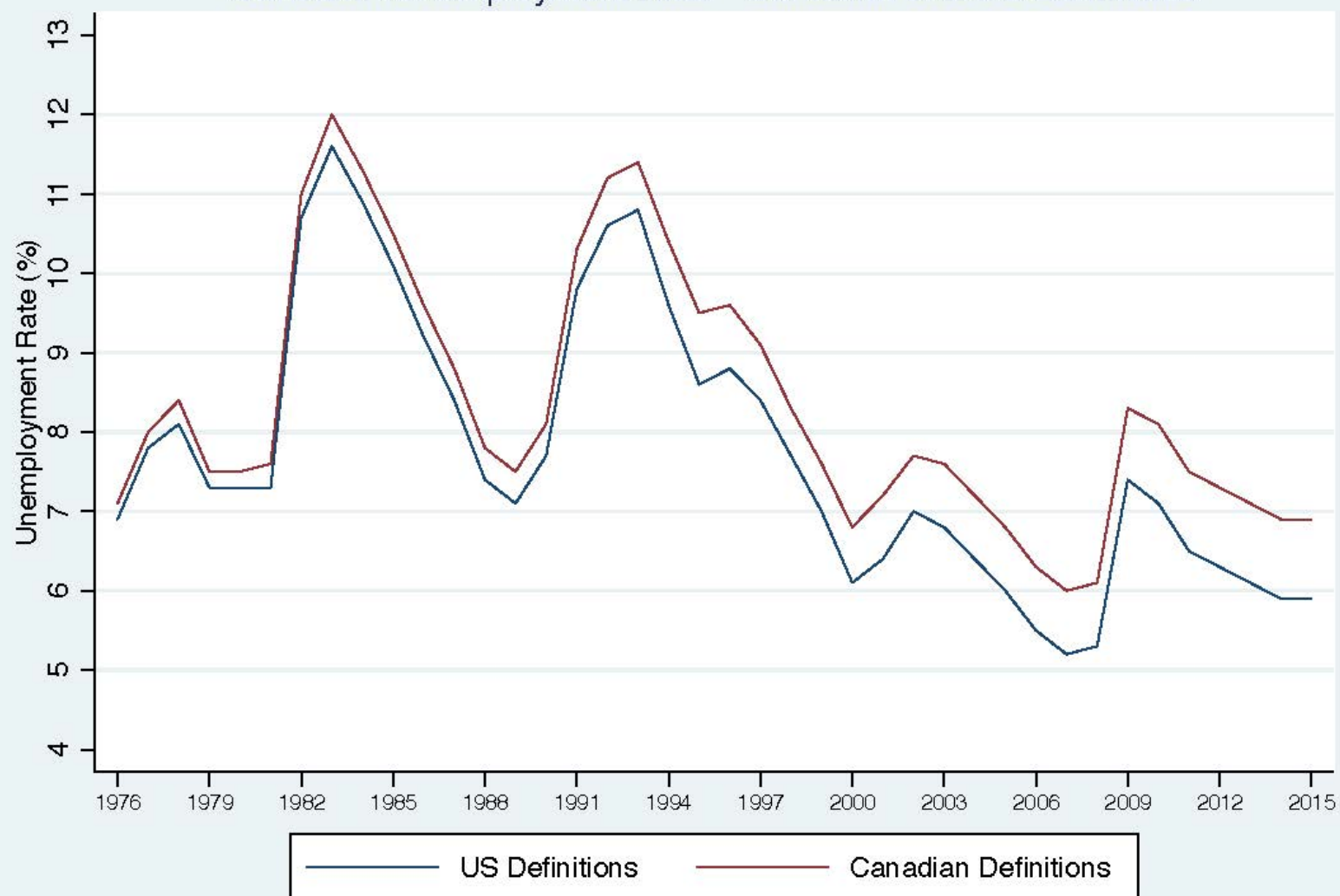
1997-2015
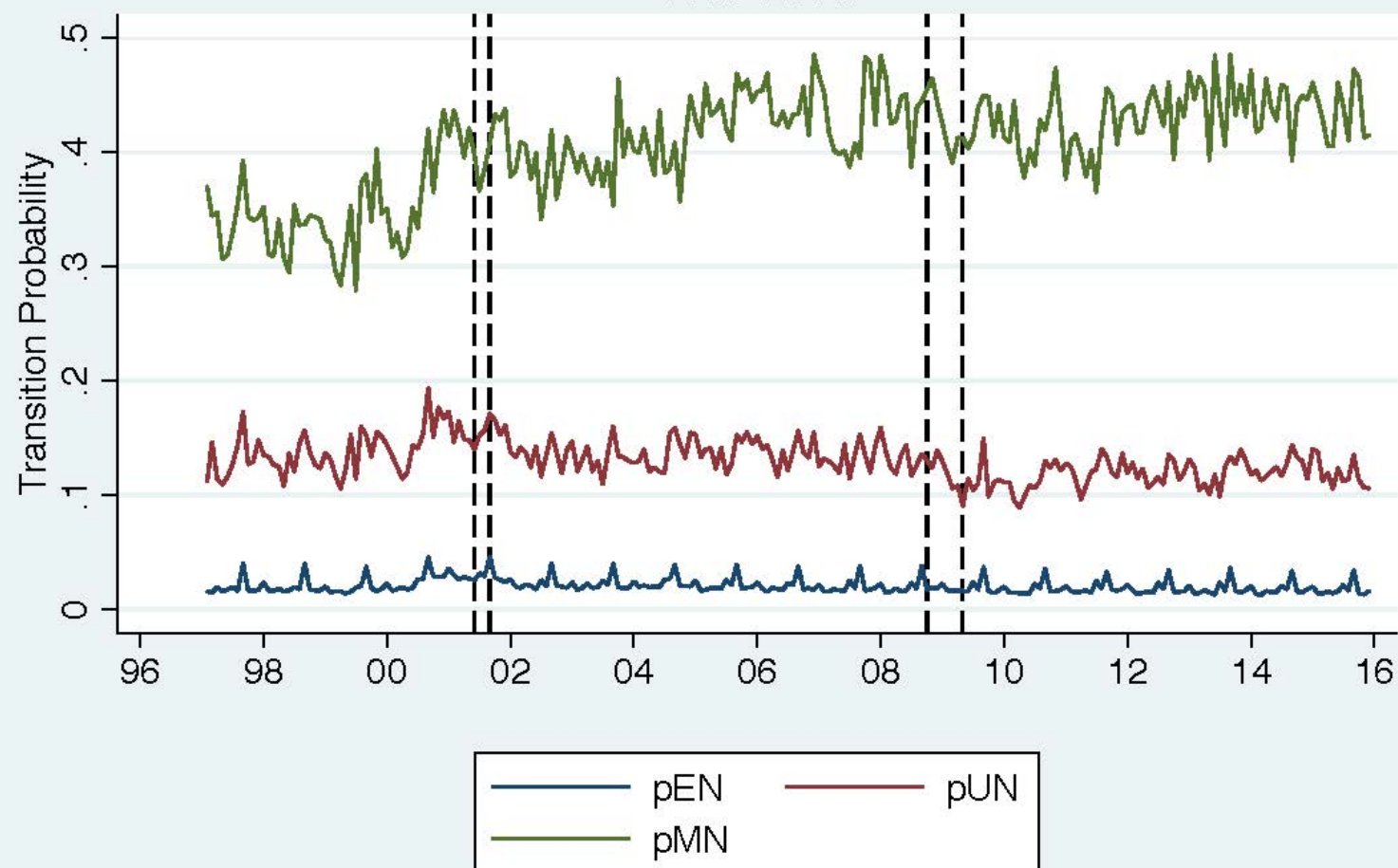
Appendix Figures: Canadian employment, labor force participation and unemployment rates measured using Canadian and U.S. concepts, 1976 – 2015
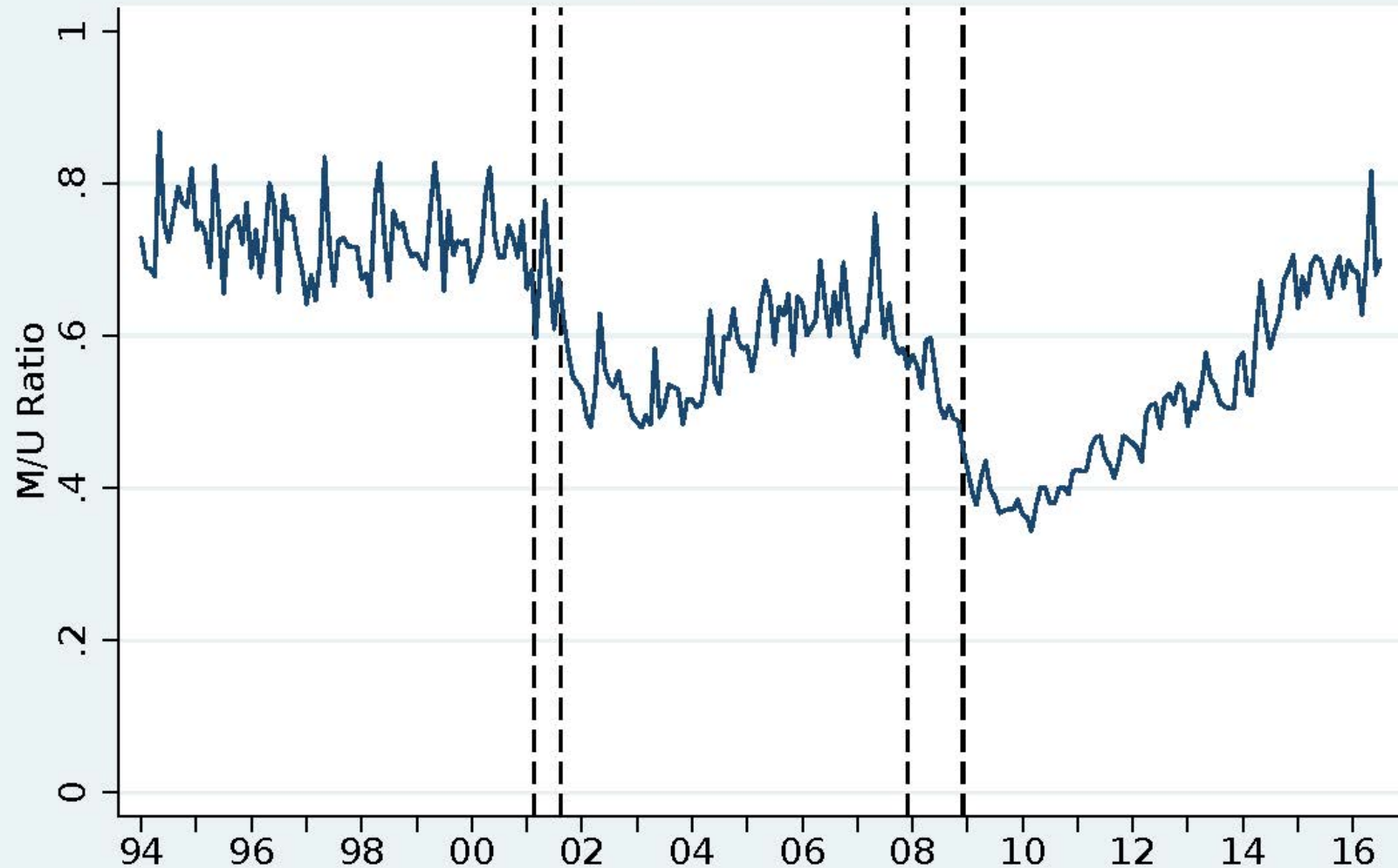

Canadian Employment Rate - Canadian and US Definitions

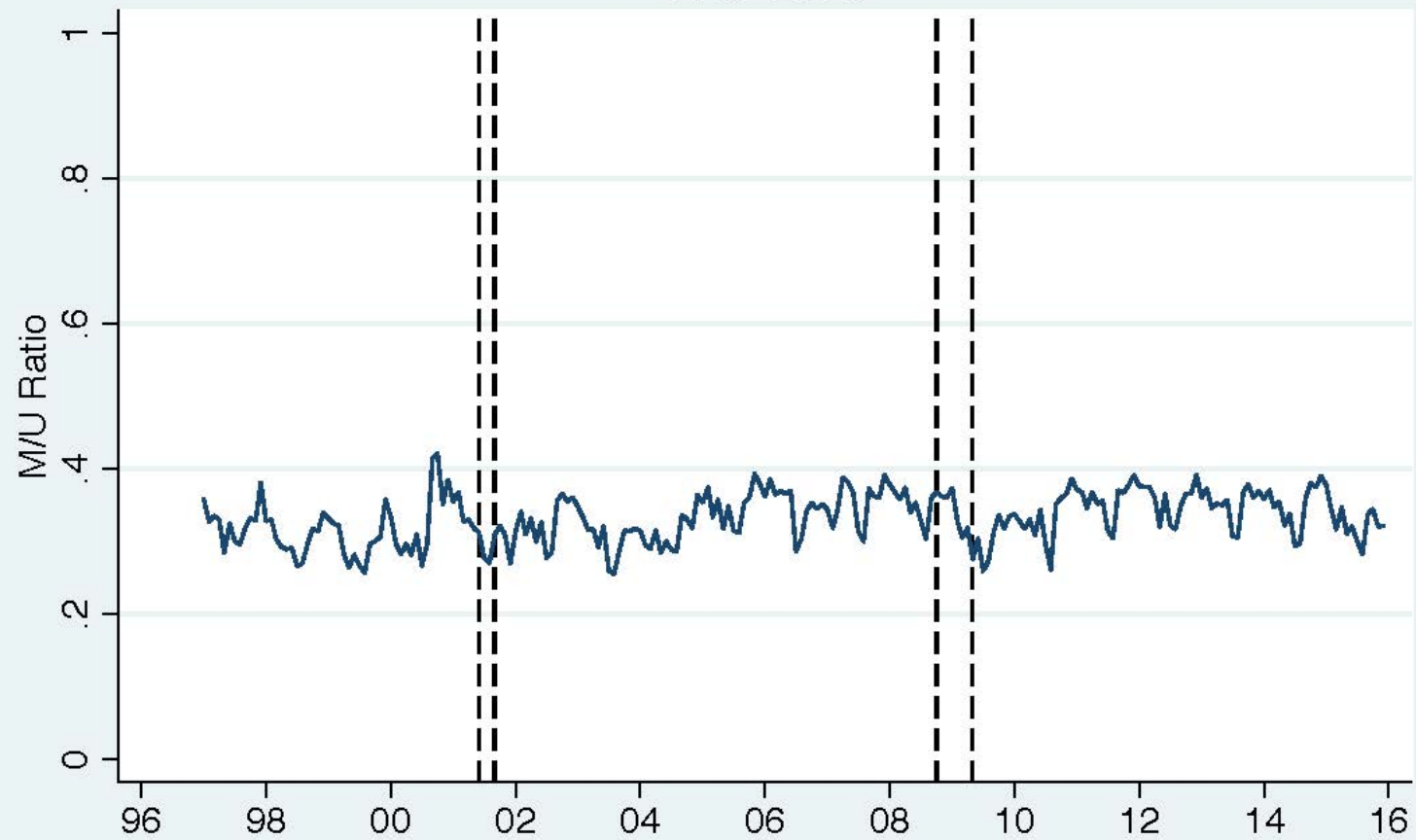Canadian Participation Rate - Canadian and US Definitions

Canadian Unemployment Rate - Canadian and US Definitions

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US0: Marginally Attached / Unemployment Ratio
1994-2015

CAN0: Marginally Attached / Unemployment Ratio
1997-2015

Appendix Tables

Table A1a: Sources of Changes in Unemployment, Canada, Monthly, 1976 – 2015

Total adult population

Time Period	Unemployment change (%)	P(NE)	P(U|NE)	P(LF)
		Amount contributed by:		
Jan 1976 - Jan 1980	0.055	-0.053 (-96%)	0.151 (274%)	-0.043 (-78%)
Jan 1980 - June 1981	-0.041	-0.027 (67%)	0.002 (-5%)	-0.015 (38%)
June 1981 - Mar 1990	0.014	-0.044 (-319%)	0.087 (627%)	-0.029 (-208%)
Mar 1990 - June 2001	-0.014	0.029 (-208%)	-0.061 (439%)	0.018 (-131%)
June 2001 - Oct 2008	-0.15	-0.064 (43%)	-0.06 (40%)	-0.025 (17%)
Oct 2008 - Dec 2015	0.136	0.061 (45%)	0.049 (36%)	0.025 (19%)

Table A1b: Sources of Changes in Unemployment, U.S.A, Monthly, 1976 – 2015

Total adult population

Time Period	Log Change in Unemployment	P(N)	P(U|N)	P(LF)
		Amount contributed by:		
Jan 1976 - Jan 1980	-0.226	-0.086 (38%)	-0.097 (43%)	-0.043 (19%)
Jan 1980 - July 1981	0.134	0.022 (17%)	0.108 (81%)	0.003 (2%)
July 1981 - July 1990	-0.269	-0.095 (35%)	-0.133 (49%)	-0.041 (15%)
July 1990 - Mar 2001	-0.246	-0.041 (17%)	-0.194 (79%)	-0.01 (4%)
Mar 2001 - Dec 2007	0.151	0.044 (12%)	0.089 (59%)	0.018 (29%)
Dec 2007 - Dec 2015	0	0.082 n/a	-0.135 n/a	0.053 n/a