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# Labor Force Participation in New England vs. the United States, 2007–2015: Why Was the Regional Decline More Moderate?

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Perspectives

## Abstract:

This paper identifies the main forces that contributed to the decline in labor force participation in New England between 2007 and 2015, as well as the forces that moderated the region's decline relative to that of the nation. This exercise contributes to an assessment of the outlook for participation in New England moving forward. Similar to previous findings pertaining to the United States as a whole, the single largest factor in the recent decline in labor force participation in New England was the shifting age composition of the region's population. In particular, the share of New England residents at or above retirement age (65 and over) increased by a considerable margin, while the share of residents of prime working ages (25 to 54) decreased, and these demographic trends were more pronounced in the region than in the nation as a whole between 2007 and 2015. Partly offsetting the region's demographic disadvantages, the participation rate among those ages 65 and over increased more sharply in New England than in the United States since 2007, while the participation rate among primeage workers decreased less sharply in the region than in the nation. Together, these advantages can more than account for the lesser decline in labor force participation in the region compared with the United States between 2007 and 2015.

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**Current Policy** 

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## I. Introduction

As of August 2016, the labor force participation rate in the United States, at 62.8 percent, stands 3.6 percentage points below its pre-recession peak value of 66.4, achieved in January 2007. Between its pre-recession peak and its post-recession trough (September 2015), the participation rate fell a full 4 percentage points (see Exhibit 1a).<sup>1</sup> A number of recent papers have tried to make sense of these declines and to estimate the extent to which the currently depressed participation rate reflects cyclical as opposed to structural factors. Different methods yield different conclusions, but the most recent evidence (Aaronson et al. 2014) suggests that structural factors—most important among these being population aging—explain a significant or even a dominant share of the net declines in participation since 2007.

In the New England region, the labor force participation rate has also fallen significantly since prior to the Great Recession (Exhibit 1a). New England's current (August 2016) participation rate falls short of its own pre-recession peak value (from November 2006) by 2.4 percentage points, and the peak-to-trough decline for the region was a full 3 percentage points (New England's trough occurred in October 2015). These data indicate that the region's participation rate declined by a smaller margin than the nation's since 2007. As a result, the positive gap between New England's participation rate and the U.S. rate, a gap observed at least as far back as the mid-1970s,<sup>2</sup> increased from an average of 1.8 percentage points in 2007 to an average of 2.6 percentage points in 2015 (see Exhibit 1b).<sup>3</sup> This paper seeks to identify the main forces that contributed to the recent declines in labor force participation in New England as well as the forces that moderated recent declines relative to the national trend. This exercise contributes to an assessment of the outlook for participation in the region moving forward.

Mirroring the experience of the United States as a whole, the single largest factor in the recent decline in labor force participation in New England was the shifting age composition of the

<sup>&</sup>lt;sup>1</sup>All values are seasonally adjusted unless indicated otherwise.

<sup>&</sup>lt;sup>2</sup>The regional participation rate is not available prior to 1976.

<sup>&</sup>lt;sup>3</sup>Comparing year-to-date participation rate averages for 2016, New England's advantage has narrowed slightly, to 2.5 percentage points, but for August 2016 alone New England's participation rate exceeds the U.S. rate by 2.8 percentage points.

region's population: the share of New England residents ages 55 and over increased significantly, while the share ages 25 to 54 decreased significantly.<sup>4</sup> These changes resulted mostly from aging-in-place and only to a much lesser extent reflect net migration patterns (see Section VI). What is surprising is that the changes in age composition in the region between 2007 and 2015 were on balance less favorable to labor force participation than the corresponding changes in the United States as a whole, and yet participation fell by a smaller margin in the region than in the nation. Partly offsetting the region's demographic disadvantages, the participation rate among those ages 65 and over has increased more sharply in New England than in the United States since 2007, while the participation rate among prime-age workers decreased less sharply in the region than in the nation. Together, these advantages can more than account for the lesser decline in labor force participation in the region compared to the United States between 2007 and 2015 (considering the change in average participation rates between those years). Between these two advantages, the smaller regional decline in prime-age participation appears to have been more important quantitatively than the region's larger increase in participation among those ages 65 and over.

The regional advantage in participation growth among seniors in recent years derives partly from the fact that the average level of educational attainment is higher among senior citizens in New England than it is among senior citizens nationwide—an advantage that has been in place since at least the late 1970s. In addition, however, considering only senior citizens with some college education or more, the labor force participation rate increased by a larger margin in New England than in the United States since 2007. Two separate factors may have boosted participation gains in the region relative to the nation among those 65 and over with at least some college. First, average age within this demographic group declined by a larger margin in the region than in the nation over the period. Second, more-recent cohorts of college-educated seniors are more likely to participate than previous cohorts, even after controlling for age, and, based on some measures, these cohort effects were stronger in New England than in the United States on average.

<sup>&</sup>lt;sup>4</sup>The share of young adults, ages 16–24, was roughly constant in the region over the period in question.

The region's strong relative performance with respect to prime-age participation since 2007 also reflects to some extent the region's higher average level of educational attainment, because nationwide the declines in prime-age participation were less severe among those with at least some college education than among those with only a high school education or less. But educational composition fails to fully explain the different participation trends between the United States and New England, because among those with at least some college education the participation rate declined by a smaller margin in the region than in the United States, and participation trends among prime-age women were more favorable in the region than in the nation at all levels of educational attainment.

It is somewhat misleading to speak about changes in labor force participation for the New England region as a whole, however, because recent changes vary significantly across the New England states. In addition, region-wide figures tend to be dominated by Massachusetts, which accounted for 45 to 46 percent of the region's (adult) population during the period under consideration. Between 2007 and 2015, Maine experienced the sharpest decline in labor force participation among the New England states and a sharper decline than the United States as a whole (see Exhibit 2). Massachusetts, New Hampshire, and Connecticut each posted declines that were more moderate than the U.S. decline, and the remaining New England states experienced declines that are within 0.2 percentage points of the U.S. change. These comparisons are qualitatively robust across different choices of the initial and final dates used to calculate the changes in labor force participation.<sup>5</sup> Within the region, population aging was most pronounced in the northern New England states (Maine, Vermont, and New Hampshire), and accordingly aging can explain a relatively large share of the participation declines observed in these states. In Rhode Island and Connecticut, aging was somewhat less important, and weak labor markets were relatively more important.

## II. Changes in age composition

<sup>&</sup>lt;sup>5</sup>This robustness fails in the case of Vermont, which experienced a sharper peak-to-trough decline than the United States by close to 1 percentage point. See Column 3 of Exhibit 2.

For the United States as a whole, Aaronson et al. (2014) estimate that changes in the age distribution of the population can account for roughly half of the decline in the U.S. labor force participation rate between 2007 and 2013. (When their paper was written, the most recent data were for 2013.) The most important age-related factor in the decline in the national participation rate in recent years was the increase in the population share of individuals ages 65 and older, because historically members of this group have been much less likely to seek employment than individuals under age 65, excluding children (defined as ages 15 and under). Two other unfavorable demographic trends at the national level included an increase in the share of residents of pre-retirement age-defined as between the ages of 55 and 64-and a decrease in the share of prime-working-age adults-defined as between the ages of 25 and 54. Individuals of pre-retirement age have historically been less likely to participate in the labor force than those of prime working age, and therefore both of these latter trends would have reduced the overall participation rate, all else being equal. Individuals between the ages of 16 and 24 are also less likely to participate in the labor force than prime-age adults, but the share of U.S. residents in this young adult age group declined by a small margin (roughly 0.6 percentage point) between 2007 and 2014.6 For the remainder of the analysis, "adult population" refers to those ages 16 and over.

Changes in age composition within the New England region between 2007 and 2015 were, on balance, even less favorable to labor force participation than were the corresponding changes in age composition for the United States as a whole. While the increase in the share of adults ages 65 and over between 2007 and 2014 was only slightly greater in the New England region than in the United States as a whole over the same period, the share of adults ages 55 to 64 increased by a somewhat larger margin in the region than in the nation, and the share of adults of prime working age (25 to 54) decreased by a significantly larger margin in the region (see Exhibit 3).

<sup>&</sup>lt;sup>6</sup>Data and exhibits describing population shares by age group are based on data from the American Community Survey, which are available only through 2014. However, calculations of labor force participation rates rely on the CPS-IPUMs, which are available for complete years through 2015. Population shares by age can be constructed from either data set, but those from the ACS should be considered more reliable. All population shares are calculated as a percentage of population ages 16 and over only. Labor force participation rates are also calculated based on the population ages 16 and older only, and within this group only civilian, non-institutionalized individuals are included.

Between 2007 and 2014, the share of adults ages 16 to 24 was roughly flat in the region and declined slightly in the United States, and therefore these changes did not have a large impact on participation either in the region or nationally. In light of these demographic patterns, it is safe to use the shorthand term "population aging" to summarize the changes in population age composition between 2007 and 2014, whether in the New England region or for the United States as a whole. Furthermore, the available evidence suggests that net migration patterns are likely to have had only a negligible impact on the age composition of the population, as discussed in Section VI below.

For each New England state, we can make quantitative estimates of the contribution of the aging of the adult population to changes in its labor force participation rate between 2007 and 2015. To do so, we adopt two separate approaches. In the first approach, called "Method 1," we construct for each state a counterfactual participation rate for 2015 that reflects the state's actual adult age composition as of 2015, but that holds age-specific labor force participation rates fixed at their respective 2007 (12-month average) levels for the state.<sup>7</sup> The difference between this counterfactual participation rate for 2015 and the actual participation rate in 2007 represents the change in a state's labor force participation rate that would have arisen based solely on the change in a state's age composition over the period. This difference, expressed in terms of raw percentage points, is then compared with the actual percentage-point change in labor force participation for the given state over the period. Results are shown in Exhibit 4a, in the rows labelled "Actual Change in LFP Rate" and "Method 1: Fixed LFP by Age." We also compute the ratio of the counterfactual (aging-related) change in the participation rate to the actual change in order to measure the percentage of the actual change that is attributable to changes in the age composition. These results are shown in Exhibit 4b in the row labelled "Method 1."

The method using the first counterfactual is sensitive to the choice of 2007 as the initial date because age-specific participation rates in 2007 may have been somehow anomalous or away

<sup>&</sup>lt;sup>7</sup>Calculations rely on the IPUMS-CPS. Monthly participation rates by state are not seasonally adjusted, but are averaged (after weighting within the month) within the year to smooth out the effects of seasonal variation. We use multi-year age ranges (16–24, 25–34, 35–44, 35–54, 55–64, 65 and over) instead of single-year ages because sample sizes in the IPUMS-CPS at the state level are too small to produce reliable estimates of labor force participation rates by single-year age group by state.

from trend. For robustness purposes we make a second calculation of the contribution of population aging, using a different approach. To arrive at this alternative estimate, we construct a new counterfactual participation rate for 2015—called Method 2—that holds the population shares by age group fixed at their 2007 levels and sets age-specific participation rates at their actual values observed as of 2015.<sup>8</sup> The difference between this new counterfactual 2015 participation rate and the actual 2007 rate represents the portion of the change in participation that is explained by everything *except* changes in age composition since 2007.<sup>9</sup> Therefore, the portion of the actual change in participation that is *not* explained under this scenario must reflect changes in age composition since 2007. Results are shown in Exhibits 4a (in raw percentage-point terms) and 4b (as a percentage of the actual change) in the rows labelled "Method 2: Variable LFP by Age."

As seen in Exhibits 4a and 4b, the predicted contributions of population aging to declines in labor force participation are uniformly greater using Method 1 than with Method 2.<sup>10</sup> Nonetheless, the ranking of New England states (and the United States) in terms of the respective contributions of aging does not differ depending on which method is used. In all the New England states except Connecticut, the estimated decline in labor force participation attributable to aging is greater than for the nation as a whole, whether considered in absolute percentage-point terms (Exhibit 4a) or as a share of the actual change in the labor force participation rate over the period (Exhibit 4b). This reflects the fact, mentioned above and described in greater detail below, that, on balance, age composition trends were less favorable to labor force participation in the region than in the nation overall. Based on changes in age

<sup>&</sup>lt;sup>8</sup>Both Method 1 and Method 2 are based on methods used in Aaronson et al. (2014b), which is an earlier version of Aaronson et al. (2014).

<sup>&</sup>lt;sup>9</sup>For this calculation we do not need to know what caused the changes in the age-specific participation rates, but we do know that they were not caused by broad changes in age composition. However, this statement must be qualified by the fact that we calculate participation rates for multi-year age ranges (described in footnote 8 just above) rather than for each single year of age; therefore, changes in age composition within those bins might have induced changes in participation if rates differed significantly by single-year-of-age within a given bin.

<sup>&</sup>lt;sup>10</sup>As discussed in greater detail below, this difference reflects the fact that the predicted negative effects of aging on participation were offset in reality by increases in participation rates among older individuals.

composition alone, the region should have experienced a greater decline in participation than the U.S. by roughly 0.2 percentage points.<sup>11</sup>

In terms of raw percentage points (Exhibit 4a), among New England states the predicted contribution of aging is highest in Maine, the state that also experienced the largest actual decline in labor force participation over the period. The next-largest predicted effects of aging are seen in Vermont and New Hampshire. Not far behind New Hampshire are Massachusetts and Rhode Island, which are roughly tied with each other in terms of the estimated decline in participation due to aging. The impact of aging on participation was significantly weaker in Connecticut, which is the only state in the region for which the estimated effect of aging is smaller than it is for the nation.

The variation across the New England states in the estimated contributions of aging naturally reflect differences between the states in the extent of population aging since 2007. The northern New England states, and Maine especially, experienced the largest declines in the population share of prime working age (Exhibit 5, top panel), the largest increases in the population share ages 55 to 64 (Exhibit 5, middle panel), and the largest increases in the population share ages 65 and over (Exhibit 5, lower panel).<sup>12</sup> Even prior to these recent aging trends, Maine stood out within the region for having the highest population share ages 65 and over.

Exhibit 5 also illustrates the extent to which shifts in population age composition were less favorable within a given New England state than in the United States between 2007 and 2014. For all New England states except Vermont the increase in the population share ages 55 to 64 was greater than it was over the same period for the nation as a whole. At the same time, each New England state experienced a decline in the population share of prime working age that was at least as great as, if not greater than, the decline in the prime-age share in the United States as a whole.

<sup>&</sup>lt;sup>11</sup>The predicted age-induced decline for the region is based on a population-weighted average of the declines predicted for each New England state. The difference in the age-induced declines in participation between the United States and New England rounds to 0.2 percentage points using either Method 1 or Method 2.

<sup>&</sup>lt;sup>12</sup>The differences in the respective changes in age composition between Maine and Vermont are generally not statistically significant.

## III. Factors offsetting the effects of population aging

As seen in Exhibits 4a and 4b, in both Massachusetts and New Hampshire, the actual decline in labor force participation between 2007 and 2015 was less than the decline that is predicted based on changes in age composition holding all else constant.<sup>13</sup> In order to understand these outcomes it is necessary to identify the factors that compensated for the negative effects of population aging on labor force participation. These positive offsetting effects more than made up for the negative effects of aging on participation in Massachusetts and New Hampshire, and similar effects at least partly offset the negative impact of aging in the remaining New England states, as well as in the United States as a whole. By construction, changes in labor force participation rates over time that cannot be explained by changes in age composition alone must be attributable to changes in age-specific participation rates over time, at least in a superficial sense. These latter changes are referred to as cohort effects, because they reflect changes in age-specific participation rates across different birth cohorts.

The cohort effects that were most important in terms of offsetting the negative effects of aging on labor force participation in recent years were the increases in labor force participation among individuals ages 65 and over. As seen in Exhibit 6a, the participation rate for this age group increased significantly between 2007 and 2015, in both New England and the United States. Looking farther back, Exhibit 6b shows that the region's participation advantage among senior citizens emerged in the late 1990s, was roughly constant between 2000 and 2008, and then widened between 2008 and 2015. Smoothing out fluctuations in the data, between 2007 and 2015 the participation rate among seniors in New England gained about 1.7 percentage points relative to the national participation rate among those ages 65 and over.<sup>14</sup> For the region, the participation increase among seniors boosted the overall participation rate change over the period by roughly 0.8 percentage point, while for the nation the corresponding boost amounts to just under 0.5 percentage point. The difference between these figures predicts that New England's participation gap (over the United States) would have increased by 0.3 percentage

<sup>&</sup>lt;sup>13</sup> For New Hampshire under Method 2, the predicted decline is only 1 percent greater than the actual decline.

<sup>&</sup>lt;sup>14</sup>Data are smoothed by fitting a 3<sup>rd</sup>-order polynomial to the yearly data, using Stata's "lpoly" command. Similar smoothing methods are used whenever the analysis refers to "smoothed" data.

points between 2007 and 2015, accounting for more than one-third of the actual 0.8 percentagepoint increase in the gap.<sup>15</sup>

Participation rates declined among prime-age workers over the period, in both New England and the nation, but the decline was less severe in New England—minus 0.7 percentage point in the latter as opposed to minus 1.9 percentage points in the United States. (Exhibits 7 and 8, discussed further below, show prime-age participation trends by education and sex for New England and the United States.) For the nation, the decline in prime-age participation over the period, holding all else equal, predicts a decline in overall participation of roughly -1 percentage point, while for New England the corresponding predicted decline is about -0.4 percentage point.<sup>16</sup> Although the prime-age cohort effects are negative in both the region and the United States, the weaker effect in the region predicts that overall participation would have declined by about 0.6 percentage points less in New England than in the United States, holding all else constant. Therefore, in terms of the region's performance relative to the United States, the smaller regional decline in prime-age participation played a larger role than did the larger regional increase in participation among those ages 65 and over.

Cohort effects among the remaining age groups are less important for explaining the labor force participation rate change in the region compared with that of the nation. Among those ages 55 to 64, the participation rate increased modestly in New England between 2007 and 2015 and was basically flat in the United States for the same time period. This regional advantage predicts an additional 0.1 percentage point increase in the participation gap between the region and that of the United States over the period under consideration. Among the population ages 16-to-24 years old ("young adults"), labor force participation declined significantly at both the regional and national levels between 2007 and 2015, but the regional decline was only slightly greater than the national decline. Combined with the fact that young adults comprise a relatively small share of the adult population (whether in the region or the nation), the steeper

<sup>&</sup>lt;sup>15</sup>The "participation gap" for a given year is defined as the difference between the average monthly labor force participation rate in New England for the given calendar year minus the average monthly rate in the United States for the same year. The change (increase) in the gap between 2007 and 2015 refers to the difference between the 2015 regional participation gap and the 2007 gap.

<sup>&</sup>lt;sup>16</sup>These calculations hold population shares by age at their 2007 averages.

regional decline in young adult participation predicts only a very small disadvantage—less than 0.1 percentage point—for the region relative to the United States in terms of the net change in overall participation between 2007 and 2015.

## IV. Why have gains in labor force participation among senior citizens been larger in New England than in the United States since 2007?

It is a well-established fact that individuals with more education, both male and female, are more likely to participate in the labor force than those with less education (for those ages 25 and over, to ensure that education is mostly complete), a difference that holds even among those ages 65 and over. In addition, the New England region has, on average, a more highly educated populace than the national average. According to the American Community Survey, between 2007 and 2014 the share of adults in New England with a completed college degree consistently exceeded the corresponding share in the United States by at least 7 percentage points. Therefore, it is natural to ask whether differences in educational composition between the New England population and the U.S. population can help to explain why labor force participation among those ages 65 and over increased by a larger margin in the region than in the United States in recent years.

Among those ages 65 and over, compared with the United States, New England enjoyed a consistently higher share of residents with at least some college education or more between 2007 and 2015. As seen in Exhibit 9, this regional advantage stems from its higher share of those with completed college education. Considering either the share of seniors with some college (but no degree), or the share of seniors with completed college (or more), population shares by educational attainment moved roughly in parallel in the United States and New England between 2007 and 2015 (again see Exhibit 9). New England's persistent educational advantage predicts that the region would have seen a greater increase in labor force participation among seniors than the United States since 2007, because at the national level labor force participation increased among seniors with some college or more and was roughly flat among seniors with only a high school diploma or less, and assuming that participation rates in the region followed

these national participation trends. However, in addition to this regional advantage stemming from educational composition, labor force participation increased at a faster pace in New England than in the United States considering only individuals ages 65 and over with at least some college education, as seen in Exhibit 10. The faster regional increase in participation among college-exposed senior citizens applies in roughly equal measure to both sexes, and has served to amplify the positive impact on labor force participation stemming from the region's fixed advantage in educational attainment among its senior citizen population.

The recent increases—whether in the region or the nation—in participation rates among those ages 65 and over with at least some college may reflect the fact that average age declined within this demographic group between 2007 and 2015, in both the region and the nation. Younger seniors are more likely to participate in the labor force than older seniors, and this effect would have been strengthened beginning in 2003, the first year in which the increases in the full Social Security retirement age began to bite.<sup>17</sup> Recent time trends in mean age by demographic subgroup (within the 65-and-over population) are correlated in the expected direction with recent time trends in participation rates. For example, between 2007 and 2015, among seniors with at least some college, mean age declined by a larger margin in New England than in the united States, while participation increased by a larger margin in New England than in the nation (see Exhibit 11).<sup>18</sup> Among seniors with only a high school diploma or less, average age was basically flat over the period (net of fluctuations) in both New England and the United States, while participation rates were also almost flat (and very similar to each other), with only a slight increasing trend, in both the region and the nation.

The age trends (among the 65-and-over population) by education and location may reflect a number of factors. In 2010, the leading edge of the baby boom generation (born in 1945) turned age 65, and the subsequent influx of young senior citizens is likely to have pushed down the

<sup>&</sup>lt;sup>17</sup>In 2003, the cohort of individuals born in 1938 turned age 65 and faced a full retirement age of 65 and two months. Full retirement age was then increased for each rising cohort by two months per year until 2008, when it was increased to 66 for cohorts born in 1943–1954. Later birth cohorts will face additional phased increases in retirement age, up to age 67, but these will not start to bite until 2021.

<sup>&</sup>lt;sup>18</sup>Between 2000 and 2007, the respective time trends in mean age (among seniors with at least some college) in New England and the United States moved roughly in parallel, as did the corresponding time trends in labor force participation rates for this demographic group.

average age of those ages 65 and over.<sup>19</sup> The fact that average age declined only among those with at least some college education (whether in New England or the United States) may reflect the condition that recent cohorts turning age 65 are disproportionately college-educated relative to older seniors.

The facts described above are consistent with the hypothesis that declining mean age among college-educated seniors helped to cause the recent increase in labor force participation for this group, and also suggest that the steeper regional decline in mean age may explain the steeper regional increase in participation.<sup>20</sup> However, recent cohorts of seniors may exhibit different labor market behavior than previous cohorts even after controlling for differences in mean age. To examine this possibility we restrict the samples (regional and national) to individuals between the ages of 66 and 70. The age range starts at 66 to take out any effects on participation caused by the increases in full retirement age between 2003 and 2008. The upper end is set at 70 to ensure a large enough sample in the region. In the resulting samples, whether for the United States or New England, average age is roughly flat between 2005 and 2015 at just below 68 years. Therefore, any trends in participation within this age range over the time period can properly be classified as cohort effects rather than age effects.

Between 2007 and 2015, the labor force participation rate among college-educated individuals ages 66 to 70 increased by nearly 6 percentage points in New England and gained only about 3 percentage points in the nation as a whole (Exhibit 12a). For the same time period and age range, the participation rate among those with only a high school diploma or less increased by about 0.5 percentage point in New England and rose by an even smaller margin in the United States (less than 0.2 percentage point). That is, more-recent cohorts of college-educated individuals ages 66 to 70 (whether in the United States or New England) are more likely to be in the labor force than previous cohorts at the same age, and this difference appears to be more

<sup>&</sup>lt;sup>19</sup>It is not obvious why mean age among seniors with some college started falling before 2010, in both New England and the United States.

<sup>&</sup>lt;sup>20</sup>This effect should technically be classified as an age-composition effect, which could, in principle, be teased out by using narrower age ranges when predicting the effects of changes in age composition on participation. However, sample sizes in the CPS for New England become increasingly small as age groups narrow, reducing confidence in the estimates of labor force participation rates by age group.

pronounced in the region than in the United States, on average. These patterns suggest that cohort effects may be at least partly responsible for the respective regional and national increases in labor force participation among all seniors (65 and over) with at least some college, and may also help to explain the larger regional increase in participation among collegeeducated seniors.

However, the changes in participation rates cited above are calculated using raw data that are compared at just two points in time. Alternative calculations can be made using smoothed time series and/or using different starting and ending dates, and the estimated changes in participation over time are sensitive to these particulars. Consider, for example, the changes in participation among 66-to-70-year-olds with at least some college between 2005 and 2014: in New England participation increased by 1.7 percentage points, while in the United States participation increased by the larger margin of 2.8 percentage points. Comparing the changes between 2005 and 2015, the regional increase is roughly on par with the national increase. The sensitivity of estimates is reduced using smoothed time series, but in those cases the changes depend on the length of the time series used and the fitting method. Looking at smoothed data for the longer time period of 1994 to 2015, for the demographic group of interest the participation rates do appear to be trending upwards in both New England and the United States, and the gap between the regional and national participation rates appears to have increased since 2007 as well as over the longer term (Exhibit 12b). When using a smoothed version of the shorter time series (2005–2015), however, the larger regional increase is not highly robust.

One puzzling feature of these trends is that the positive cohort effects on participation over time are much weaker, or possibly non-existent (considering only the period since 2007), for groups with only a high school education or less. To gain greater insight into these cohort effects and their variation with educational attainment, we can look to the earlier labor market behavior of these same birth cohorts, which might help to explain their subsequent labor market behavior at older ages. To do this, consider Exhibit 13, which shows labor force participation by educational attainment among individuals ages 55 to 64 for the period 1994 to 2004. The cohorts covered in this analysis include all of those that would have turned 65 between 2005 and 2014, as well as individuals up to age 75 in 2005 and people as old as 85 in 2015. Among those with at least some college education, labor force participation exhibits an increasing trend between 1994 and 2004 in both New England and the United States, but it is not clear that the participation gap between New England and the United States increases over this period. Also counter to expectation, among members of these cohorts with only a high school diploma or less participation is consistently higher in the region than the United States and this participation gap increases over the period. Based on these patterns, as these cohorts reached age 65 and higher ages, one would have expected to see a positive participation gap between the region and the United States within both education groups. However, as previously observed, between 2005 and 2015 participation rates among high-school educated seniors are roughly equal between New England and the United States, which means that the regional advantage in participation among the high-school educated disappeared as these cohorts moved past retirement age, while the regional participation advantage among the college-educated persisted.

# V. Why did participation fall less among prime-age workers in the region than in the United States?

As stated above, labor force participation among prime-age individuals (ages 25 to 54) declined both regionally and nationally between 2007 and 2015. However, the decline was smaller in the region than in the United States overall, by at least 1 percentage point, based on a conservative estimate. The region's relatively moderate decline in prime-age participation accounts for roughly 60 percent of the positive cohort effects that helped to bring about the smaller decline in all-ages participation in the region relative to the nation between 2007 and 2015. The region maintained a roughly constant advantage over the United States between 2007 and 2015 in terms of the average educational attainment level of its prime-age population. Over that period, respective population shares with some college or more increased roughly in parallel between New England and the United States, as did the respective population shares with completed college. At the national level between 2007 and 2015, the declines in labor force participation among prime-age individuals were less severe among those with at least some college than among those with less education. If the region had experienced the same (absolute) declines in labor force participation rates by education group as the United States (among prime-age individuals), New England's consistently higher share of college-educated residents would have ensured its smaller decline in prime-age participation.

However, as seen in Exhibit 7, New England also enjoyed a more favorable participation trend than the United States in recent years among prime-age individuals with at least some college. Among this latter group between 2007 and 2015, the participation rate was roughly flat in New England, but declined by roughly 2 percentage points at the national level. For the same period, participation rates among prime-age individuals with only a high school education or less declined in both the region and the nation, but stayed roughly parallel to each other.

Decomposing the data by both gender and educational attainment, it becomes apparent that the difference in participation trends between the region and the United States-among collegeeducated individuals of prime age-is much more pronounced among women than men. Based on the smoothed time series for 1994 to 2015 (Exhibit 8), labor force participation among primeage women with at least some college actually increased in New England between 2007 and 2015, by 1.5 percentage points. In the raw data, the corresponding increase is greater than 2 percentage points, and it is safe to say that labor force participation among the region's collegeeducated, prime-age women has been at least flat since 2005. For this same demographic group nationwide, participation declined by slightly more than 1 percentage point between 2007 and 2015 (in either the raw or smoothed data), and this estimate is not highly sensitive to choosing an earlier starting year (such as 2005 or 2006). Therefore, among college-educated prime-age women, the region widened its participation gap over the United States since 2007, by at least 1 percentage point and up to 3 percentage points. A similar comparison among men of the same demographic profile shows that the region's participation rate may have gained a slightly greater edge over the national rate, but only by 0.5 percentage point or less: both rates declined, but the national decline was steeper than the regional decline.

In the combined male-female data described above, participation trends among those with only a high school education or less were roughly parallel between the United States and New England. However, considering only women with high school or less, the positive participation gap between the region and the United States increased between 2007 and 2015. This increased gap contributed to the stronger overall performance of prime-age participation in the region relative to the nation, but it is less important than the contribution of college-educated women for two reasons: (1) more than 60 percent of the region's women have some college education or more (this share increased from 60 to 66 percent between 2005 and 2015), and (2) the increase in the New England-U.S. participation gap between 2007 and 2015 was greater among college-educated women than among high-school-educated women.

As pointed out by the Council of Economic Advisors (2016), the share of prime-age individuals collecting Social Security Disability Insurance (SSDI) has increased in the United States, both since 2007 and over the longer term. Because participation rates are very low among SSDI recipients, increases in SSDI claiming rates are associated with reduced labor force participation. Even if SSDI recipients were capable of working, the rules for collecting disability insurance virtually prohibit substantive work, and therefore labor force participation rates among (disabled) SSDI recipients are close to zero.<sup>21</sup> However, between 2007 and 2014 the SSDI collection rate among prime-age individuals increased more sharply in New England than nationwide (Exhibit 14). All else being equal, this fact predicts that prime-age participation would have declined more sharply in the region than in the United States since 2007. Therefore, trends in SSDI claiming rates cannot explain why the region experienced a more moderate decline in LFP among individuals of prime working age than the United States.

# VI. Potential impact of net migration flows on labor force participation

<sup>&</sup>lt;sup>21</sup>It is difficult to measure labor force participation among SSDI recipients using the CPS, because it contains only noisy indicators of whether an individual collects SSDI, and these are included only in the once-yearly March supplement or ASEC data, not in the regular monthly CPS data.

In principle, net migration flows might alter the age composition of the New England population as well as the labor force participation rate, depending on the ages and labor force status of individuals leaving and entering the region. Unfortunately, migration data by labor force status are not readily available for the region. Total net migration rates by state, including both international and domestic flows, are available from the Census Bureau for 1991 through 2015, not including the years 2000 and 2010. In addition, domestic net migration rates by age group and state and tax-filing status are available from the Internal Revenue Service for the years 2012 through 2014. The latter data are useful to the extent that age and tax-filing status may be indicative of labor force status, but they face the limitation of omitting international flows. Exhibit 15 summarizes the IRS data on net domestic migration rates for New England, both by state and at the regional level. Excluding international migration flows, the region as a whole suffered a net loss of prime-working-age residents (ages 26 to 54) between 2012 and 2014-see "Overall Rate" values for this age group. Again, based on domestic flows only and considering the "Overall Rate" figures, the region also lost population ages 65 and over, and at a somewhat smaller rate than it lost population of prime working age. These shifts together would have tended to increase the population share of those ages 65 and over relative to the population share of prime-age individuals. At least at the regional level, however, the difference in net migration rates between these two age groups was too small (over the period of observation) to have made a significant impact on these respective population shares, although without data on international migration by age it is hard to draw sharp conclusions.

It is possible that prime-age individuals exiting the labor force in New England subsequently moved out of the region, perhaps in search of a lower cost of living or better job opportunities elsewhere. Among New England states, Rhode Island and Connecticut suffered, respectively, the largest and second-largest spikes in unemployment during the Great Recession. Accordingly, these two states also experienced the highest net outflow rates (within the region) of prime-age citizens between 2012 and 2014. If the region experienced a net outflow of prime-age citizens that was biased towards non-participants, this would have boosted the labor force participation rate among those who stayed in the region. The migration rates by tax filing status

may offer some insight into this question. For individuals of prime age, those exempt from filing taxes are arguably less likely to be labor force participants than those required to file.<sup>22</sup>

To test for whether those migrating out of the region were disproportionately likely to be exempt from filing (and therefore disproportionately likely to be out of the labor force), one can compare the respective net migration rates for tax-exempt (prime-age) individuals and tax-filing (prime-age) individuals. If the (signed) net migration rate (expressed as inflows net of outflows per thousand) among tax-exempt individuals is less than the net migration rate of the tax filers for the state or region, then the share of tax-filing (prime-age) residents in the region would have increased relative to the share of tax-exempt (prime-age) residents. However, in most New England states and most years, this has not been the case-net migration rates have actually been greater (less negative) among the tax-exempt prime-age population than among the nonexempt prime-age population.<sup>23</sup> This fact is evidenced in the exhibit by the fact that migration rates for the tax-exempt are greater than the overall rates.<sup>24</sup> Among those ages 65 and over, domestic net migration rates for the region are lower among the tax-exempt than among taxfilers, a factor that may have boosted the participation rate among the region's seniors. However, the differences between migration rates by tax status for this age group are too small to explain a significant portion of participation rate increases. Based on these domestic net migration figures, at least, migration patterns do not appear to have had a significant impact on labor force participation rates in the New England states between 2012 and 2014.

## VII. Contribution of business cycle fluctuations to recent changes in labor force participation

Thus far, the discussion has focused on the contribution of structural factors to recent changes in labor force participation, such as changes in the age composition and educational

<sup>&</sup>lt;sup>22</sup>Labor force participants with very low earnings might also be exempt, so the proxy is imperfect. Among senior citizens, tax-exempt status is likely to be an even weaker proxy for being out of the labor force, because non-participating seniors have to file taxes if they have sufficient retirement income.

<sup>&</sup>lt;sup>23</sup>Exceptions to this statement include Rhode Island and Vermont in 2013, and Rhode Island in 2014. However, the difference in net migration rates between the tax-exempt and tax-filers is small in all these cases.

<sup>&</sup>lt;sup>24</sup>The overall rates represent averages between the two groups; therefore, if one group's rate falls below the average, it falls below the other group's rate.

composition of the population. However, labor force participation contains a cyclical component as well. Weakening labor demand causes some individuals to leave the labor force, perhaps after a spell of unemployment, and these same individuals may flow back into the labor force as job opportunities improve. At the national level, the estimated cyclical response has historically been quite modest, although the response is difficult to measure because it may be obscured by the effects of longer-run trends on participation. However, given the extremely weak labor market conditions that emerged during the Great Recession and that persisted well into the recovery period, since 2007 participation rates are likely to have been depressed in part for cyclical reasons.

Exploiting cross-state variation in unemployment rate changes and labor force participation rate changes during the Great Recession, Erceg and Levin (2014) argue that cyclical factors can fully explain the decline in prime-age labor force participation that occurred between 2007 and 2012. However, Aaronson et al. (2014) find that Erceg and Levin's estimates are quite sensitive to the small number of years included in their regression sample, raising the concern that apparent cyclical effects may have been caused by unobserved factors that coincided with the increase in unemployment during the Great Recession, because previous business cycles were excluded from the analysis.

In order to estimate the cyclical contribution to changes in labor force participation in New England—and compare this contribution to the corresponding effect at the national level—this paper adopts an approach very similar to that of Aaronson et al. (2014), with some modifications. The basic idea is to relate state-level labor force participation rates to state-level unemployment rates (and their lags), controlling for fixed differences across states and for time-varying state-level demographic characteristics. Using a panel of state-level data at a yearly frequency from 1978 to 2015, the method consists of a state fixed-effects regression that exploits within-state variation over time in participation and unemployment rates, controlling for macroeconomic factors common to all states within a given year.<sup>25</sup>

<sup>&</sup>lt;sup>25</sup>The data for a given state and a given year represent averages of the monthly data for the given calendar year, as computed in the CPS, using the appropriate weights. The monthly data at the state level are not seasonally adjusted.

In estimating the cyclical effects on labor force participation at the national level, Aaronson et al. use data from all 50 states. However, the resulting model does a poor job predicting labor force participation rates in the New England states. Therefore, to estimate cyclical effects on participation that are relevant to the New England region, the sample is restricted to the six New England states. The model employs the same extensive list of time-varying demographic controls employed by Aaronson et al., but it does not include state-specific year trends because their inclusion results in the model behaving poorly. Rather, state fixed effects and year dummies are employed, respectively, to control for fixed differences across states and fixed differences over time common to the New England states. (Standard errors are not clustered at the state level because there are too few states for this purpose.)

Results of the various model specifications are shown in Exhibit 16. The simplest model, shown in the results column (1), includes only the current unemployment rate and the demographic controls. The model in column (2) adds three lags of the unemployment rate, as well as the once-lagged labor force participation rate. The models in columns (3) and (4) are analogous to the model in column (2) but employ restricted sets of years (either 1990–2015 or 1978–2007). The discussion here focuses on the results in columns (2) and (3). Both models include the full set of explanatory variables, but the model in column (2) is estimated over the complete time series (1978–2015), while the model in column (3) is estimated over the more-recent data (1990–2015) and may therefore be more representative of current economic relationships. Looking at column (2), the results indicate that a state's labor force participation rate declines by 0.23 percentage points for each 1-percentage-point increase in the state's contemporaneous unemployment rate. The effects of lagged unemployment are sometimes negative and sometimes positive, but none are statistically significant.

The "total cyclical effect" represents the combined marginal effect of current and lagged cyclical factors on current participation.<sup>26</sup> The total cyclical effect in column (2) is both statistically and economically significant—and is considerably greater than the total cyclical effect on

<sup>&</sup>lt;sup>26</sup>In column 1, the total cyclical effect is just the sum of the coefficients on the unemployment rate terms. In columns 2 through 4, the calculation is less straightforward and takes into account the effect of the lagged labor force participation rate.

participation for the United States as a whole, as estimated by Aaronson et al. (2014). This latter comparison suggests that labor force participation is subject to larger cyclical fluctuations in New England than on average across all 50 states. However, the total cyclical effect on participation for the New England states is considerably weaker when the model is estimated using only the more recent data (1990–2015), as seen in column (3) of Exhibit 16. In addition, when estimated over the 1990–2015 period, the total cyclical effect on participation for the New England states is roughly equal to the total cyclical effect estimated for all 50 states for the same period.

These results can be used to estimate how much the labor force participation rate in a given state might be depressed (or elevated) in the current environment, based on how the unemployment rate in the state compares with its natural rate. To calculate this effect, one takes the difference between the actual current unemployment rate for the state and the natural rate of unemployment for the state and multiplies this difference by the coefficient on the current unemployment rate. (In a model with unemployment rate lags, the calculation also makes use of lagged unemployment rates and their coefficients.) If the current unemployment rate is higher than the natural rate, then labor force participation will be lower than it would otherwise be based on cyclical conditions, and vice versa if the unemployment rates are not available. In order to proceed, the (current) natural unemployment rate for a state is set to the minimum unemployment rate observed in the state in the years between the two most recent recessions (the Great Recession and the 2001 recession).<sup>27</sup>

Exhibit 16 also shows estimates of the cyclical shortfall in labor force participation as of the second quarter of 2016 in each New England state. These are based on the natural rate assumptions, the coefficient estimates in the given column, and the relevant (current and lagged) actual unemployment rates for the state. Consistent with the fact that Connecticut and Rhode Island had the two highest unemployment rates in the region as of 2016:Q2—and with

<sup>&</sup>lt;sup>27</sup>A second approach takes the minimum unemployment rate observed over each of the past five inter-recession periods, and a third approach takes the average of these five minimum values. Results do not differ much depending on which natural rate is used.

the fact that these two states experienced the two highest unemployment rates in the region throughout the Great Recession and recovery—the estimated cyclical shortfalls are greatest in these two states, regardless of the regression model under consideration. For both Connecticut and Rhode Island, the estimated cyclical shortfall in participation as of 2016:Q2 exceeds 1 percentage point (based on estimates in Column 2), although estimates in Column 3 indicate much less severe shortfalls for both states. In the remaining New England states, in all models, the estimated cyclical participation gaps are generally modest—less than -0.5 percentage point—and in many cases are positive. The positive estimates arise because some state unemployment rates as of the second quarter of 2016 are below the respective estimated state natural rates of unemployment.

An estimate of the cyclical shortfall in participation for the New England region as a whole (for the second quarter of 2016) is obtained by taking the population-weighted average of the estimates for the six New England states. This calculation is made separately for each of the models in columns 2, 3, and 4. Results are shown in the second-to-last row of Exhibit 16. As a point of comparison, the bottom row of the table shows the corresponding estimated cyclical shortfalls in participation for the Unites States as a whole, which are obtained by updating the estimates of Aaronson et al. (2014) to reflect the most recent data.<sup>28</sup> Based on the results of the model that uses the complete time series (1978–2015; see column 2), the estimated shortfall in labor force participation as of the second quarter of 2016 is somewhat greater for the New England region than for the nation as a whole. This larger shortfall arises because—based on results pertaining to 1978–2015—fluctuations in unemployment exert greater effects on labor force participation within New England than in the United States on average.

Based on the results using the more-recent data only (1990–2015; see column 3), the current shortfall in labor force participation in New England is roughly zero, while the participation gap for the United States remains negative (at roughly -0.5 percentage point). Recall that in the

<sup>&</sup>lt;sup>28</sup>To update the Aaronson et al. results, we add data for 2014 and 2015 and run regressions based on their original code, using data from all 50 states (plus Puerto Rico). To calculate the cyclical shortfalls for 2016:Q2, we use the resulting coefficient estimates and updated values for U.S. unemployment rates and the U.S. natural rates. Results are available from the author on request.

more-recent data the marginal effects of unemployment on labor force participation are roughly equal between the New England states and the remaining states. Therefore, the more benign cyclical shortfall in New England compared with the United States—as predicted by patterns in the data since 1990—reflects the fact that the New England states on average currently have (and have had in recent years) smaller unemployment rate gaps than the United States, and in some cases even have negative unemployment rate gaps.<sup>29</sup>

Based on the more-pessimistic prediction that New England currently faces a cyclical shortfall in labor force participation that exceeds the estimated shortfall for the United States, cyclical factors cannot help to explain why the region's labor force participation rate has declined by a smaller margin than the nation's since 2007. However, ignoring patterns in the data prior to 1990, the region's relatively favorable unemployment picture compared with the U.S. average both currently and in recent years—may at present be boosting participation in the region relative to the United States.

## VIII. The outlook for labor force participation in New England

This analysis has identified a number of factors that helped to moderate declines in labor force participation in the region relative to the United States between 2007 and 2015. Despite the fact that demographic changes—population aging in particular—should have imposed a larger drag on labor force participation in the region than in the United States in recent years, this larger drag was more than offset by beneficial cohort effects in the region. In particular, labor force participation in New England increased significantly (and by more than in the United States) among college-educated senior citizens, and participation held steady or even increased among prime-age women in the region, while at the same time female participation rates fell modestly in the United States. The underlying causes of these regional advantages are hard to pinpoint, and obvious factors such as differences in underlying educational composition cannot alone explain the differing trends between the region and the United States. In addition, neither

<sup>&</sup>lt;sup>29</sup>The unemployment rate gap is the difference between the actual unemployment rate at a given time and the estimated natural unemployment rate.

migration patterns for the region nor changes in disability insurance rates help to explain the smaller decline in labor force participation in the region. Declining average age among the region's college-educated seniors helps to explain the relatively large increase in participation by this group, but additional evidence shows that participation rates among college-educated seniors increased by a larger margin in New England than in the United States even among those within the narrow age range of 66-to-70 years. The stronger cohort effects within the region suggest that, for selected demographic groups, characteristics of the regional population are more favorable for labor force participation than the characteristics of the national population on average. Alternatively, factors inherent in the regional economy—rather than necessarily inherent in its citizens—would appear to encourage greater labor force participation among those with at least some college education. Among these individuals, the region's relatively low unemployment rate represents a cyclical factor that may have boosted participation in the region relative to the United States, especially in the past two years.

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Exhibit 1b: Labor Force Participation Rate

Source: Bureau of Labor Statistics; Seasonally-Adjusted Data

(Percentage Points)								
State	U.S. peak to current (Jan. 2007–Aug. 2016)	2007 average to 2015 average	Each Area Peak- Trough*					
United States	-3.6	-3.39	-4.0					
Connecticut	-2.4	-2.77	-3.7					
Maine	-3.7	-3.98	-5.2					
Massachusetts	-2.0	-1.73	-2.6					
New Hampshire	-1.5	-2.39	-2.8					
Rhode Island	-3.8	-3.57	-4.2					
Vermont	-4.0	-3.58	-4.9					

Exhibit 2: Labor Force Participation Pate Declines in New England States

Source: Author's calculations based on data from the Bureau of Labor Statistics, provided by Haver.

\*Note: Peaks were constrained to be in 2006 or later; peak and trough dates are as follows: U.S: Jan 07-Sep 15, CT: Apr 08-Nov 13, ME: Dec 06-Feb16, MA: Nov 06-Jan 16, NH: Jan 07-Jan 16, RI: Jan 07–Feb 16, VT: Oct 06–Dec 15.

#### Exhibit 3: Population Shares by Age Group, New England and United States, 2005–2014









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#### Exhibit 4

## Estimated Contribution of Changes in Population Age Composition to Changes in Labor Force Participation, 2007 to 2015; United States and New England States

New Rhode United Estimation method Connecticut Maine Massachusetts Vermont States Hampshire Island -3.39 -2.77-3.98 -1.73 -2.39-3.57 -3.58 Actual change in LFP Method 1: -2.20 -1.39 -3.94 -2.51-2.83-2.48-3.19 Fixed LFP by Age Method 2: -2.23 -2.41 -2.22 -2.72 -1.99 -1.36 -3.22 Variable LFP by Age

4a. Changes in LFP Rates Induced by Changes in Age Composition, in Absolute Percentage Points

4b. Changes in LFP Rates Induced by Changes in Age Composition, as a Percentage of Actual Change

	United States	Connecticut	Maine	Massachusetts	New Hampshire	Rhode Island	Vermont
Method 1: Fixed LFP by Age	65%	50%	99%	145%	118%	69%	89%
Method 2: Variable LFP by Age	59%	49%	81%	129%	101%	62%	76%

*Source*: Author's calculations based on data from Integrated Public-Use Microdata Series of the Current Population Survey (IPUMS-CPS), produced by the Bureau of Labor Statistics.

*Notes:* Method 1 sets the labor force participation rate for each age group in each state (or the United States at its monthly average from 2007, based on non-seasonally adjusted monthly data in the IPUMS-CPS. Method 2 calculates the 2015 average participation rates by age group and state in a similar manner. Population shares by age group (2007 average and 2015 average) are calculated in the same manner as the labor force participation rates, also using the monthly IPUMS-CPS. Age groups are as follows: 16–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, 85 and over.

#### Exhibit 5: Population Shares by Age Group: New England States and United States Total







Source: Census Bureau, American Community Survey. Adult population refers to individuals ages 16 and older.

Exhibit 6a



Exhibit 6b



Source: Author's calculations based on Bureau of Labor Statistics' Current Population Survey Integrated Public Use Microdata Series (IPUMS-CPS).





Source: Author's calculations based on Bureau of Labor Statetics' Current Population Survey Integrated Public Use Microdata Series (PUMS-CPS)





Source: Author's calculations based on Bureau of Labor Statistics' Current Population Survey Integrated Public Use Microdata Series (IPUMS-CPS).

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Source: Author's calculations based on Bureau of Labor Statistics' Current Population Survey Integrated Public Use Microdata Series (IPUMS-CPS).

Exhibit 10



Source: Author's calculations based on Bureau of Labor Statistics' Current Population Survey Integrated Public Use Microdata Series (IPUMS-CPS).

Exhibit 11



Source: Author's calculations based on Bureau of Labor Statistics' Current Population Survey Integrated Public Use Microdata Series (IPUMS-CPS).

Exhibit 12a



Exhibit 12b







Source: Author's calculations based on Bureau of Labor Statistics' Current Population Survey Integrated Public Use Microdata Series (IPUMS-CPS).





Source: Author's calculations based on data from the Social Security Administration and the American Community Survey.

## Exhibit 15

		Year								
			2012		2013			2014		
Region or State		All	Ages 26	Over	All	Ages 26	Over	All	Ages 26	Over
		Ages	to 54	65	Ages	to 54	65	Ages	to 54	65
New England	Overall Rate	-2.31	-2.01	-1.74	-2.43	-2.28	-1.20	-3.55	-3.27	-2.77
	Tax-Exempt Rate	-2.12	-1.82	-1.97	-2.28	-2.10	-1.45	-3.32	-3.02	-2.99
	Overall Rate	-4.25	-3.28	-4.22	-5.54	-4.38	-5.30	-6.45	-5.21	-6.40
Connecticut	Tax-Exempt Rate	-3.88	-2.95	-4.62	-5.20	-4.06	-5.72	-5.97	-4.82	-6.72
	Overall Rate	0.30	0.48	2.76	1.01	1.39	3.08	1.25	1.84	3.44
Maine	Tax-Exempt Rate	0.47	0.47	2.54	1.11	1.44	2.79	1.42	1.95	3.46
	Overall Rate	-1.83	-1.99	-2.15	-2.26	-2.72	-1.86	-3.69	-4.16	-2.72
Massachusetts	Tax-Exempt Rate	-1.74	-1.82	-2.28	-2.19	-2.52	-2.12	-3.57	-3.90	-2.93
New Hampshire	Overall Rate	0.17	0.71	4.85	2.28	2.02	8.77	0.64	1.89	0.61
	Tax-Exempt Rate	0.19	0.66	4.21	2.50	2.14	8.99	0.91	2.05	0.25
Rhode Island	Overall Rate	-4.91	-4.90	-5.24	-3.77	-3.54	-1.75	-4.78	-5.00	-4.54
	Tax-Exempt Rate	-4.57	-4.57	-5.04	-3.71	-3.58	-1.99	-4.70	-5.04	-4.73
Vermont	Overall Rate	-2.65	-1.27	-1.33	-1.72	-0.35	-1.07	-2.73	-1.45	-1.11
	Tax-Exempt Rate	-2.32	-0.97	-1.87	-1.63	-0.44	-1.41	-2.29	-1.13	-1.32

## Net Domestic Migration Rates by State, Age Group, and Tax Status, 2012-2014 (Inflows minus Outflows per Thousand Persons)

*Source*: Author's calculations based on data from the Internal Revenue Service. "Overall Rate" refers to the net migration rate among all persons residing in the state at some point during the year; "Tax Exempt Rate" refers to the net migration rate only among persons exempt from filing federal taxes.

#### Exhibit 16

Dependent Variable: State Labor Force Participation Rate	(1)	(2)	(3)	(4)
	1978–2015	1978–2015	1990–2015	1978–2007
Independent Variables:				
Once-Lagged Labor Force Participation Rate (by State)		0.36***	0.21**	0.23***
		(0.06)	(0.08)	(0.07)
Unemployment Rate (by State)	-0.35***	-0.23**	-0.25*	-0.25*
	(0.10)	(0.11)	(0.14)	(0.14)
Once-Lagged Unemployment Rate (by State)		-0.10	-0.06	-0.16
		(0.13)	(0.16)	(0.15)
Twice-Lagged Unemployment Rate (by State)		0.10	0.15	0.29*
		(0.13)	(0.16)	(0.16)
Thrice-Lagged Unemployment Rate (by State)		-0.16	-0.05	-0.24*
		(0.11)	(0.14)	(0.13)
Number of Observations	228	210	156	162
R-Squared	0.87	0.88	0.89	0.87
Total Cyclical Effect	-0.35***	-0.61***	-0.26***	-0.47***
Standard Error of Cyclical Effect	0.10	0.19	0.18	0.26
Implied Cyclical Shortfall as of 2016:Q2, CT	-0.49	-1.30	-0.30	-0.97
Implied Cyclical Shortfall as of 2016:Q2 ME	0.32	-0.35	0.30	-0.09
Implied Cyclical Shortfall as of 2016:Q2 MA	0.14	-0.41	0.15	-0.20
Implied Cyclical Shortfall as of 2016:Q2 NH	0.21	-0.28	0.21	-0.08
Implied Cyclical Shortfall as of 2016:Q2 RI	-0.25	-1.40	-0.05	-0.85
Implied Cyclical Shortfall as of 2016:Q2 VT	0.07	-0.27	0.06	-0.15
Implied Cyclical Shortfall as of 2016:Q2 New England Ave.		-0.67	0.04	-0.41
Implied Cyclical Shortfall as of 2016:Q2 U.S. Average		-0.47	-0.47	-0.54

New England State Panel Regressions: Labor Force Participation Rates in Relation to Current and Lagged Unemployment Rates; Implied Cyclical Shortfalls in Participation

*Source:* Author's calculations based on data from the Bureau of Labor Statistics' Current Population Survey Integrated Public Use Microdata Series (IPUMS-CPS), Haver Analytics, and Congressional Budget Office.

*Notes:* Data used pertain to New England states only. All models include state fixed effects, year dummies, and an extensive set of controls for time-varying demographic composition by state. Standard errors are in parentheses below each coefficient estimate. Implied cyclical shortfall for the U.S. is derived from a separate model run on data from all 50 states. Key to symbols: \*\*\* denotes statistical significance at the 1 percent level, \*\* denotes significance at the 5 percent level, and \* denotes significance at the 10 percent level.