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**Internal Migration in the United States:  
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**Internal Migration in the United States:  
A Comprehensive Comparative Assessment of the Consumer Credit Panel**

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We introduce and provide the first comprehensive comparative assessment of the Federal Reserve Bank of New York/Equifax Consumer Credit Panel (CCP) as a valuable and underutilized data set for studying internal migration within the United States. Relative to other data sources on US internal migration, the CCP permits highly detailed cross-sectional and longitudinal analyses of migration, both temporally and geographically. We compare cross-sectional and longitudinal estimates of migration from the CCP to similar estimates derived from the American Community Survey, the Current Population Survey, Internal Revenue Service data, the National Longitudinal Survey of Youth, the Panel Study of Income Dynamics, and the Survey of Income and Program Participation. Our results establish the comparative utility and illustrate some of the unique advantages of the CCP relative to other data sources on US internal migration. We conclude by identifying some profitable directions for future research on US internal migration using the CCP, as well as reminding readers of the strengths and limitations of these data. More broadly, this paper contributes to discussions and debates on improving the availability, quality, and comparability of migration data.

JEL Codes: R23, C81, O15, J61, C55.

Keywords: Internal migration, Consumer Credit Panel, Comparative, Cross-sectional, Longitudinal.

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## 1. Introduction

Human migration is an important demographic, economic, environmental, geopolitical, and socio-cultural process (Black et al. 2011; Bodvarsson and Van den Berg 2013; Brettell and Hollifield 2015; Castles, de Haas, and Miller 2014; Massey et al. 1998; White 2016). It is therefore concerning that migration data have been and continue to be plagued by significant problems of availability, quality, and comparability. While these problems are pronounced for data on international migration (Abel and Sander 2014; Levine, Hill, and Warren 1985; Poulain, Perrin, and Singleton 2006; Raymer et al. 2013; Willekens et al. 2016), data on internal migration are not immune to such problems (Bell et al. 2002, 2015a, 2015b).

With respect to the aim of this paper, this lack of immunity applies to data on internal migration in the United States (Isserman, Plane, and McMillen 1982; Kaplan and Schulhofer-Wohl 2012; Long 1988; Molloy, Smith, and Wozniak 2011) and motivates our work to introduce and provide the first comprehensive comparative assessment of the Federal Reserve Bank of New York\Equifax Consumer Credit Panel (CCP) to demonstrate the utility and some of the unique advantages of these data (Lee and van der Klaauw 2010; Whitaker 2018). We begin by introducing the CCP and describing two problems that these data resolve better than other data sources on US internal migration. We then compare cross-sectional estimates of migration from the CCP to similar estimates derived from the American Community Survey (ACS) and the Current Population Survey (CPS), and migration data from the Internal Revenue Service (IRS). This is followed by comparing longitudinal estimates of migration from the CCP to similar estimates derived from the National Longitudinal Survey of Youth (NLSY 1979 and 1997), the Panel Study of Income Dynamics (PSID), and the Survey of Income and Program Participation (SIPP 2004 and 2008).<sup>1</sup> Our results firmly establish the

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<sup>1</sup> Panel Study of Income Dynamics, public use dataset. Produced and distributed by the Institute for Social Research, University of Michigan, Ann Arbor, MI (2018)

comparative utility and clearly illustrate some of the advantages of the CCP relative to other data sources on US internal migration, thereby warranting greater use of these data in future research on internal migration in the United States.

## **2. Problems with Migration Data**

At a basic level, migration is one of three components of population change (Preston et al. 2001); however, extensive literatures also detail the economic, environmental, geopolitical, and socio-cultural causes, characteristics, and consequences of migration (Ali and Hartmann 2015; Bodvarsson and Van den Berg 2013; Black et al. 2011; Brettell and Hollifield 2015; Castles, de Haas, and Miller 2014; Hunter, Luna, and Norton 2015; Massey et al. 1998; Massey and España 1987; Massey, Pren, and Durand 2016; National Academies of Sciences, Engineering, and Medicine 2017; White 2016). Given the breadth and depth of past and current efforts to study migration, as well as policy efforts to monitor and manage migration (International Organization for Migration 2018), it is therefore concerning that migration data are notoriously poor and suffer from well-documented problems of availability, quality, and comparability.

These problems are particularly severe for data on international migration (Abel and Sander 2014; Levine, Hill, and Warren 1985; Poulain, Perrin, and Singleton 2006; Raymer et al. 2013; Willekens et al. 2016). Bracketing the issue of whether data on international migration are collected at all, the quality and comparability of migration data are problematic for at least three reasons. First, because of both the different underlying definitions and data collection systems used, information is not necessarily collected on the same phenomenon. For example, in some cases, data on migrations (i.e., transitions or events) are collected, while, in others, data on migrants (i.e., persons who have changed their residential status) are collected. Second, if one or more are employed at all, different timing criteria (one-year, a

few months, etc.) are used to identify and therefore count migration and migrants. Third, there are substantial differences with respect to coverage and undercounting, which is an increasingly important consideration in light of whether and how countries track and ultimately respond to flows of asylum seekers and refugees (Abel 2018; Long 2015). As a result, bracketing several recent sets of harmonized estimates of international migration among European countries (e.g., see Raymer et al. 2013), publicly available data on international migration (e.g., from the World Bank and the United Nations) and estimates derived from them (e.g., see Abel and Sander 2014) are of differing quality and are not necessarily comparable across countries. The same is true for cross-national comparisons of internal migration data and estimates (Bell et al. 2002, 2015a, 2015b).

Even if the focus is restricted to internal migration in a single country like the United States, which is the focus of this paper, and to one data source, two key problems remain (Isserman, Plane, and McMillen 1982; Kaplan and Schulhofer-Wohl 2012; Long 1988; Molloy, Smith, and Wozniak 2011). The first problem is that there is usually a tradeoff between temporal and geographic specificity. With respect to the former, more frequent measurements of migration permit seeing migration for what it is, namely, a demographic event. However, more frequent measurements of migration come at the expense of data collected at finer spatial scales (counties, census tracts and blocks, etc.). Further complicating this picture is that many data sources commonly used to study US internal migration (e.g., the CPS and the PSID) are surveys with small sample sizes. This raises serious concerns about the accuracy of estimates of migration, especially at finer spatial scales, as well as privacy concerns (Abowd 2018; Ruggles 2018).

The second problem of sample attrition is unique to longitudinal migration data. To provide a concrete example, while the PSID took precautions to ensure high rates of follow-up in each successive wave after the start of the survey in 1968 (Hill 1992), “attrition in the

PSID has been substantial” (Fitzgerald 2011; see also Fitzgerald, Gottschalk, and Moffitt 1998; Lillard and Panis 1994). The same is true for other longitudinal surveys like the SIPP (Zabel 1998). Not surprisingly, numerous studies have been conducted to ensure that the PSID has remained nationally representative (Fitzgerald, Gottschalk, and Moffitt 1998; Hill 1992; Morgan 1979). However, these efforts and findings notwithstanding, high attrition in longitudinal surveys like the PSID and SIPP further calls into question the accuracy of estimates of migration, especially over longer time spans and at finer spatial scales.

As a result of the two problems discussed above, what we know and do not know about internal migration in the United States, both temporally and geographically, is a mixed bag that reflects substantial differences in the logic, implementation, and shortcomings of existing data sets (Isserman, Plane, and McMillen 1982; Kaplan and Schulhofer-Wohl 2012; Long 1988; Molloy, Smith, and Wozniak 2011). And while there is always some slippage between the ideal and what is feasible in practice, the overarching aim of this paper is to call attention to other valuable and underutilized data sources, specifically, the CCP, that better resolve the two problems discussed above.

### **3. Introducing the Consumer Credit Panel (CCP)**

As described in detail by Lee and van der Klaauw (2010) and Whitaker (2018), data in the CCP are drawn from a list of credit histories of 240 million US adults maintained by Equifax, which is one of three national credit reporting agencies (NCRAs). Firms that extend credit to consumers provide monthly reports to NCRAs containing the addresses of borrowers and information on debt-financed consumption activities, including outstanding balances, payments, delinquencies, and more. The CCP sample is drawn from the complete set of Equifax records. Each quarter, a subset of records is extracted containing every borrower for whom the last two digits of their Social Security number match one of five preselected

random two-digit numbers.<sup>2</sup> The same five random numbers are used each quarter. Because it is extremely rare for an individual's Social Security number to change, the same individuals appear in each quarterly sample, thus building their individual panel over time. When a first-time borrower appears with a matching Social Security number, that person enters the sample. Individuals can exit the sample by allowing seven years to pass with no credit activity, emigrating from the United States, or dying. According to Lee and van der Klaauw (2010), the end result of these procedures is "a 5% random sample that is representative of all individuals in the US who have a credit history and whose credit file includes the individual's social security number."

At present, more than 100 papers, including working papers, have been published using the CCP.<sup>3</sup> Consumer debt is the most commonly studied topic; however, several papers have used the CCP to study internal migration and mobility. For example, Molloy and Shan (2013) show that experiencing foreclosure increases the risk of moving, but not to less desirable neighborhoods. In contrast, Ding, Hwang, and Divringi (2016; see also Hwang 2018) find that those with low credit scores, or "vulnerable residents," are not more likely than those with high credit scores to move from gentrifying neighborhoods; however, those who do leave tend to move to less desirable neighborhoods. Both Molloy and Shan (2013) and Ding, Hwang, and Divringi (2016) operationalize neighborhoods as census tracts, thus highlighting an important strength of the CCP, which is that borrowers in individual census blocks can be aggregated up to any desired spatial scale (census tracts, municipalities,

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<sup>2</sup> The last four digits of an individual's Social Security number are determined by the order of arrivals of applications for Social Security numbers in each state. Numbers are assigned from 0001 to 9999, and then resume at 0001. This is no mechanism for individuals to select a particular number (and no motivation save numerology). They are effectively random.

<sup>3</sup> See <https://www.newyorkfed.org/microeconomics/hhdc/background.html>.



counties, etc.). Additionally, the CCP, which are available on a quarterly basis, can be recoded to study migration over different time intervals. Molloy and Shan (2013) and Ding, Hwang, and Divringi (2016), for example, use the CCP to study annual migration, and we follow their lead in this paper.

Another strength of the CCP relative to other data sources such as the CPS and PSID is its very large sample size of about 10 million borrowers each quarter. This helps to significantly reduce the tradeoff between temporal and geographic specificity, discussed in the previous section. Also, because the data in the CCP are drawn from the set of all US adults with a credit report and Social Security number, problems of follow-up and attrition are comparatively much less severe.

The CCP has several weaknesses. First, according to the Consumer Financial Protection Bureau, about 10 to 11% of US adults lack a credit history with an NCRA (Brevoort, Grimm, and Kambara 2016). These numbers are higher (about 30%) and lower (about 4%) in low- and high-income neighborhoods, respectively. The CCP is therefore a sample of relatively older and more financially established adults and is not appropriate for more targeted studies of younger and/or financially disadvantaged persons. Second, the CCP is limited with respect to observables. While the CCP contains data on age and other information provided in a credit report, in explanatory studies, data in the CCP must often be merged with other data sources (e.g., tract-level data from the US decennial census) in order to examine the role of additional demographic and other factors. Third, like other administrative data sources, the CCP does not always immediately drop those who die. Finally, credit bureau data are proprietary and must be purchased or accessed via collaboration with a researcher at an institution that has an existing data agreement. In addition to the Federal Reserve System, numerous researchers at other institutions have purchased credit bureau data, so the processes are well established.

Whether the strengths of the CCP outweigh its weaknesses is an open empirical question that has received very limited attention in previous studies. For example, in a single footnote, Molloy and Shan (2013) noted that the migration rate in the CCP “is somewhat higher than the CPS”; however, they neither reported their CCP and CPS estimates nor discussed possible reasons for this discrepancy. Ding, Hwang, and Divringi (2016) go one step further and show that age-specific migration rates in the CCP are “slightly lower than those in the ACS data”; however, they provided estimates for only two years, 2006 and 2013. Accordingly, in what follows, we provide the first comprehensive comparative assessment of the CCP to demonstrate the utility and some of the unique advantages of these data for research on US internal migration.

#### **4. Overview of Empirical Approach**

The empirical portion of this paper is divided into two main sections. In the first section, we compare cross-sectional estimates of migration from the CCP to similar estimates from the ACS, CPS, and IRS. In the second section, we compare longitudinal estimates of migration from the CCP to estimates from the NLSY 1979 and 1997, the PSID, and SIPP 2004 and 2008. In doing so, we seek to exhaust the datasets that are most commonly used to study US internal migration and, in the process, to provide an important point of reference for current and future research that will be of interest to scholars, policymakers, and practitioners with an interest in US internal migration.

##### **4.1. Cross-Sectional Analysis**

###### **4.1.1 Data**

Earlier, we suggested that some of what is known and unknown about internal migration in the United States reflects differences in the logic, implementation, and shortcomings of existing data sets (Isserman, Plane, and McMillen 1982; Kaplan and Schulhofer-Wohl 2012; Long 1988; Molloy, Smith, and Wozniak 2011). As we show in Table 1, each of the four data sets used in our cross-sectional analysis is characterized by a different universe, sample size, time span, and migration information. These differences affect the comparability of estimates derived from the four data sets. The selection criteria provided in the final column of Table 1 thus represent our best attempt to restrict our analysis to the most comparable sets of observations in these four data sets, and we discuss the implications of the remaining differences for our results below.

Following Molloy and Shan (2013) and Ding, Hwang, and Divringi (2016), we focus on annual migration over the decade from 2005 forward at the state, county, and tract levels. Data on state migration are available in all four data sets. Data on county migration are available in the CCP, CPS, and IRS. The ACS does not contain county migration data; instead, it contains migration data for Public Use Microdata Areas of Migration (MIGPUMAs), which are population-based geographic units.<sup>4</sup> Data on tract migration are only available in the CCP. Our analysis also includes disaggregation by age group, described in the next subsection.

#### **4.1.2 Measures**

Just as there are many different data sets used to study US internal migration, there are many different ways to measure migration. Since the measurement of migration is not the focus of this paper, we follow the lead of Bell et al. (2002, 2015a, 2015b), who have spent the better

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<sup>4</sup> See [https://usa.ipums.org/usa-action/variables/MIGPUMA#description\\_section](https://usa.ipums.org/usa-action/variables/MIGPUMA#description_section).

part of the last two decades establishing and advocating for a set of best measurement practices that tap four dimensions of migration—intensity, distance, connectivity, and effect—in a parsimonious way. Starting with the simplest of these measures, we calculate the crude migration probability (*CMP*) in each data set as the ratio of the total number of migrants (*M*) in a given year divided by the total size of the population (*P*) at the start of the year. We subsequently calculate the *CMP* for each of three age groups: “young adults,” those between the ages of 25 and 29; “family age,” adults between the ages of 30 and 49; and “older adults,” those between the ages of 50 and 74 (Johnson, Winkler, and Rogers 2013).

$$CMP = \frac{M}{P} \quad (1)$$

The *CMP* is a measure of the “intensity,” or size or magnitude, of migration (Bell et al. 2002), and one that ignores the inherently spatial character of migration (Rogers 1975; Roseman 1971). Accordingly, as a measure of the spatial “connectivity” of migration (Bell et al. 2002), we also calculate the annual index of migration connectivity ( $I_{MC}$ ) as follows:

$$I_{MC} = \frac{\sum_{i \neq j} \sum_{j \neq i} MC_{ij}}{n(n-1)} \quad (2)$$

In the numerator of Equation 2,  $MC_{ij} = 1$  if there is a migration flow from place *i* to place *j* of any size greater than zero ( $MC_{ij} = 0$  otherwise). In the denominator, *n* is the total number of places comprising the migration network. The  $I_{MC}$  ranges from zero to one and summarizes the proportion of all potential place-to-place migration flows that are not zero, or, in more substantive terms, the degree of spatial saturation in the migration network.<sup>5</sup>

The  $I_{MC}$  imposes greater data demands than the *CMP* and requires data on place-to-place migration flows. Data on state-to-state migration are available in all four data sets. Data

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<sup>5</sup> For those accustomed to the language of [social] network analysis,  $MC_{ij}$ , *n*, and,  $I_{MC}$  are referred to as directed edges, nodes, and degree centrality, respectively.

on county-to-county migration are only available in the CCP and IRS, with data on MIGPUMA-to-MIGPUMA migration available in the ACS. Finally, data on tract-to-tract migration are only available in the CCP.

### 4.1.3. Results

Estimates of the annual *CMP* at the state, county, and tract levels are displayed in Figure 1. These estimates and their associated standard errors are also provided in tabular form in Appendix Table A1.<sup>6</sup> In the way of preliminaries, first, as should be the case within each data set, the county *CMP* is higher than the state *CMP*. In the CCP, the tract *CMP* is also higher than the county *CMP*. Second, the scale of the *y*-axis is consistent with the idea that migration is a relatively rare event (King 2012). Third, and finally, each of the nine series displayed has mostly trended downward since 2005. This is consistent with past and current research on the so-called “Great American Migration Slowdown” (Frey 2009:1; see also Cooke 2013; Kaplan and Schulhofer-Wohl 2017; Molloy, Smith, and Wozniak 2011), which may have started to reverse course in the last year or two (Frey 2017).

Excluding 2005 (discussed below), estimates of the *CMP* from the CCP are consistent with similar estimates from the ACS, CPS, and IRS. The CCP performs particularly well against the ACS,<sup>7</sup> and less so against the CPS and IRS. Comparably lower estimates of the state and county *CMP* in the CPS are likely the product of weak follow-up in the CPS (Koerber 2007). The CPS is designed to collect data in a single week; therefore, little effort is

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<sup>6</sup> Only aggregated state- and county-level migration data are provided by the IRS. Accordingly, Appendix Table A1 contains estimates of the *CMP* and associated standard errors from the CCP, ACS, and CPS.

<sup>7</sup> Recall that the ACS contains migration data for MIGPUMAs, not counties. MIGPUMAs tend to be larger in size than counties, which helps to explain why the *CMP* for MIGPUMAs in the ACS is smaller than the *CMP* for counties in the CCP, CPS, and IRS.

made to contact initial non-responders. In contrast, the ACS attempts to collect data for up to three months after the initial interview date. This difference in follow-up and other survey procedures means that the CPS is less likely to capture migrants.

The IRS data suffer from a different set of problems. One problem stems from the fact that tax returns in consecutive years must be matched in order to identify migrant and non-migrant returns (roughly equivalent to households) and associated exemptions (roughly equivalent to individuals), a process that is seldom perfect because tax returns are not always filed or filed on time (Gross 2005; Johnson, Bland, and Coleman 2008; Pierce 2015). A second problem is that, starting in 2011, the responsibility for processing these data shifted from the US Census Bureau to the IRS. Importantly, the IRS implemented different data processing procedures, including matching procedures (Pierce 2015), which may help to explain the apparent increase in the state and county *CMP* after 2011.

The 2005 estimates of the *CMP* from the CCP are noticeable departures from the rest of their respective series from 2006 forward. During this period, Equifax sought to improve the process it uses to identify borrowers' current mailing addresses from among the many addresses reported by their creditors. With each change in the underlying algorithm, there is a corresponding change in the share of records for which the census block (or tract, county, or state) does not match the census block from the same quarter one year before. The largest corrections occurred in 2004 and became smaller and less frequent thereafter, which helps to explain the pronounced spike in the *CMP* from the CCP in 2005. Similar patterns (not shown) are observed for all age groups, regions, debt levels, and credit scores.

The above limitation notwithstanding, a key takeaway from Figure 1 is that estimates of the *CMP* from the CCP are generally consistent with similar estimates from the other three data sources and are probably more accurate than estimates from the CPS and IRS (see also Appendix Table A1). Another key takeaway from Figure 1 is that, bracketing the close

correspondence between the CCP and ACS estimates, only the CCP permits further examination of annual tract-level migration. Excluding 2005, an average of 9.6% of persons migrated from one tract to another in a given year during the 2006-2018 period. As we discuss more in the next section of this paper, these sorts of estimates are sorely needed and extremely valuable for studying regular (e.g., annual or seasonal), local (e.g., tract), and very recent (e.g., up to the current year and quarter) migration, particularly in some contexts (e.g., during and after extreme weather events).

In Figure 2, we present estimates of the annual *CMP* for each of three age groups: young adults, family age adults, and older adults. These estimates and their associated standard errors are also provided in tabular form in Appendix Table A2. Estimates from the IRS data are not and cannot be provided because the IRS data are not disaggregated by age. We focus first on preliminaries. Consistent with a long line of research on age patterns of migration (e.g., see Rogers and Castro 1981), the *CMPs* for young adults are higher than those for family age adults, which, in turn, are higher than those for older adults. These differences are expected because they ultimately reflect different life-course stages that include, for example, labor force entry and [peak] working years, as well as retirement and elderly migration (Rogers and Watkins 1987; Wilson 2010). Second, recalling our earlier mention of the slowdown in US internal migration in recent years and decades (Cooke 2013; Frey 2009; Kaplan and Schulhofer-Wohl 2017; Molloy, Smith, and Wozniak 2011), our results are in line with findings from other studies showing that demographic factors, particularly changing age patterns of migration, may have played a partial role (Cooke 2011).

The results displayed in Figure 2 show that estimates of the *CMP* for each age group from the CCP are generally within the ballpark of similar estimates from the ACS and CPS. The most noticeable difference is the relatively more pronounced downward time trend in the

*CMP* among young adults in the CCP.<sup>8</sup> As we noted earlier, part of this difference relative to the time trend in the CPS estimates may have to do with the problem of weak follow-up in the CPS (Koerber 2007). However, this does not help to explain the difference relative to the time trend in the ACS estimates, which likely involves, at least in part, some consideration of sample size. The CCP contains information on approximately one million young adults in a given year. The corresponding sample sizes in the ACS and CPS are about 170,000 and 10,000 young adults, respectively. One obvious implication of these different sample sizes is that the CCP estimates are more precise. Another implication is that, in the absence of oversampling for migrants in the CCP, ACS, and CPS, simply by virtue of its larger sample size, the CCP does a better job of capturing more migrants by default.

However, the downward trend in the CCP among family age and older adults is also stronger than that in the ACS and CPS, although it is somewhat difficult to see visually in Figure 2. Results of additional analyses (not shown) indicate that the slope of this downward trend does not vary by characteristics such as credit score, census division, or homeownership. We therefore suspect that it may be related to changes in the address-updating algorithm used by Equifax.

Another area where the CCP excels relative to the other data sets is with respect to capturing the spatial “connectivity” of migration (Bell et al. 2002). In Figure 3, we display annual estimates of the  $I_{MC}$  at the state, county, and tract levels. Focusing on the state-level estimates in Panel A, the  $I_{MC}$  from the CCP and IRS is consistently around 1.0, meaning that

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<sup>8</sup> Among young adults, at the state level,  $r = -0.626$  ( $p = 0.017$ ) in the CCP. The corresponding correlations in the ACS and CPS are  $r = -0.391$  ( $p = 0.209$ ) and  $r = 0.184$  ( $p = 0.548$ ), respectively. Similarly, at the county/MIGPUMA level,  $r = -0.630$  ( $p = 0.016$ ) in the CCP,  $r = -0.749$  ( $p = 0.005$ ) in the ACS, and  $r = -0.311$  ( $p = 0.301$ ) in the CPS.



every state is connected to every other state by a positive migration flow. While this is intuitive, estimates of the  $I_{MC}$  from the ACS and CPS fall short because of their smaller sample sizes. Thus, while the ACS and CPS data are representative of the US population, they are not necessarily representative of all moves made between US states. As a result, the ACS and CPS data are poorly suited to studying the spatial connectivity of migration.

At the county level, there is considerably less spatial connectivity. As we foreshadowed earlier (see Footnote 6), estimates of the  $I_{MC}$  from the ACS are higher than corresponding estimates from the CCP and IRS because MIGPUMAs tend to have larger populations than counties and are therefore more likely to be connected. The county-level  $I_{MC}$  from the CCP has been remarkably stable over time, averaging 1.8% per year during the 2006-2015 period. The  $I_{MC}$  from the IRS has also been stable over time, but less so in more recent years, perhaps due in part to the different data processing procedures that were implemented by the IRS in 2011 (Pierce 2015; see also DeWaard et al. 2017).<sup>9</sup> Finally, considering that there are 73,057 census tracts in the United States,<sup>10</sup> and 5,337,252,192 possible migration ties among them,<sup>11</sup> it is not surprising that the tract-level  $I_{MC}$  from the CCP averaged only 0.02% during the 2006-2015 period.

Taken together, the results provided and discussed in this section establish the comparative utility and demonstrate some of the unique advantages of the CCP, at least after 2005. In the next section, we turn our attention to a similar set of exercises focusing on

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<sup>9</sup> Another potential factor is that county-to-county migration estimates in the IRS are only disclosed for flows comprised of 10 or more households.

<sup>10</sup> See <https://www.census.gov/programs-surveys/geographygeo/maps-data/data/tallies/tractblock.html>.

<sup>11</sup>  $5,337,252,192 = 73,057$  migrant-sending, or origin, tracts  $\times$   $73,056$  possible migrant-receiving, or destination, tracts.

longitudinal estimates and comparisons using the CCP and other commonly used data sources.

## **4.2 Longitudinal Analysis**

### **4.2.1 Data**

Excluding the CCP, which we described earlier in Table 1, we describe the other five data sets used in our longitudinal analysis in Table 2. These data sets are similarly characterized by different universes, sample sizes, time spans, and migration information. Unlike in our cross-sectional analyses, it is not possible to develop a single set of selection criteria that permit us to simultaneously compare all six data sets to one another. Therefore, in the final column in Table 2, we provide selection criteria that are specific to each paired comparison between the data set listed and the CCP.

Observation windows differ across each paired comparison and, excluding the SIPP04 and SIPP08, cover a roughly ten-year period since 2004 or 2005. We restrict our focus to within each paired comparison (e.g., we compare a migration estimate from the NLSY79 to a CCP-equivalent estimate based on implementing the selection criteria in Table 2), and do not compare across paired comparisons (e.g., we do not compare a migration estimate from the NLSY79 and its CCP-equivalent to an estimate from the SIPP04 and its CCP-equivalent).

We provide attrition rates and coverage ratios for all six longitudinal data sets in Table 3. The attrition rate measures the fraction of the sample at the beginning of the observation period that does not have complete location histories through the end of the period. This rate is much lower in the CCP than in the other five data sets. One likely reason for this is that borrowers are in legally binding contracts with their creditors. For most individuals, it would be costly and inconvenient to end all credit relationships, and thereby exit the set of Equifax credit records from which the CCP is drawn. In contrast, participants

can opt out of longitudinal surveys with little or no cost or consequence. The coverage ratio measures the fraction of the sample at the end of the observation period that has complete location histories through the entire period. The coverage ratio of the CCP is lower than that of the NLSY and PSID surveys because first-time borrowers are added to the CCP each year. The CCP is always a combination of complete histories and new entrants. Finally, relative to the SIPP, attrition and coverage are considerably higher and lower, respectively, in the SIPP04 and SIPP08, raising serious concerns about the utility of the SIPP for studying migration (Hernández-Murillo et al. 2011; Zabel 1998).

#### 4.2.2 Measures

Similar to Bell et al. (2002, 2015a, 2015b), Bernard (2017) recently proposed a set of ten longitudinal measures of migration. Among the simplest of these measures, and one that will likely resonate with fertility scholars, is the migration progression ratio ( $MPR_{i,i+1}$ ), which is defined as the proportion of a cohort that migrated  $i$  times that went on to migrate  $i+1$  times during the observation window:

$$MPR_{i,i+1} = \frac{M_{i+1}}{M_i} \quad (3)$$

Our starting point is to estimate the  $MPR_{0,1}$ , or the proportion of individuals in each data set who migrated at least once. We subsequently calculate the  $MPR_{0,1}$  for each of the same three age groups in our cross-sectional analysis: young adults between the ages of 25 and 29 at the start of the observation window, family age adults between the ages of 30 and 49, and older adults between the ages of 50 and 74 (Johnson, Winkler, and Rodgers 2013). Finally, we estimate the  $MPR_{1,2}$  and  $MPR_{2,3}$  in order to examine second and third migrations.

Bernard's (2017) contribution notwithstanding, the set of measures she proposed is not exhaustive and misses an important and understudied aspect of migration over the life course, which is that, for a variety of reasons, people sometimes return to the places from which they had previously migrated (Eldridge 1965; Johnson and Schulhofer-Wohl 2019). We therefore augment Bernard's (2017) work by incorporating the measure of the return migration ratio ( $RMR_{j,0,T}$ ), which we define as the proportion of individuals that resided in place  $j$  at the beginning of the observation window, migrated from  $j$  during the observation window, and returned to  $j$  by the end of the window.

$$RMR_{j,0,T} = \frac{M_{j,T}}{M_j} \quad (4)$$

### 4.2.3 Results

Estimates of the  $MPR_{0,1}$  at the state, county, and tract levels are displayed in Figure 4. These estimates and their associated standard errors are also provided in tabular form in Appendix Table A3. Starting with the NLSY79, about 10.9% and 24.7% of individuals migrated from one state and one county to another during the observation window, respectively. The corresponding CCP-equivalent estimates are 12.8% and 26.8%, respectively. In the NLSY97, the CCP-equivalent estimates of the  $MPR_{0,1}$  are slightly lower than the corresponding estimates in the NLSY79.

While estimates of the  $MPR_{0,1}$  in the NLSY79 and NLSY97 are similar to their corresponding CCP-equivalent estimates, the observed discrepancies might arise because the NLSY records location information at the annual interview date, which can occur at any point during the year. In contrast, we used first quarter location information in the CCP. Another explanation for these discrepancies is selection. As we noted earlier, the CCP is a sample of relatively older and more financially established adults. This observation is particularly

important for understanding discrepancies between estimates of the state and county  $MPR_{0,1}$  in the NLSY97 and the corresponding CCP-equivalent estimates. Specifically, individuals in the NLSY97 sample are quite young and were between the ages of 20 and 24 in 2004. Given that the CCP selects older ages by virtue of only including individuals with a credit history (Lee and van der Klaauw 2010; Whitaker 2018), the CCP potentially underestimates migration relative to other data sets and samples composed of younger adults.

Estimates of the state  $MPR_{0,1}$  in the PSID and the corresponding CCP-equivalent estimate are also comparable, with reasons for the small observed discrepancy likely similar to those discussed above. Specifically, the PSID records location information at the biennial interview date, which can occur at any time during the year. The PSID is also a representative sample of the entire US resident population, while the CCP only represents adults with a credit score and Social Security number.

The story is somewhat different for the SIPP04 and SIPP08. Estimates of the state  $MPR_{0,1}$  in these data sets are consistently and considerably lower than the corresponding CCP-equivalent estimates. The most likely explanation for these discrepancies is very high attrition in the SIPP (see Table 3). Critically, in his analysis of attrition in two earlier SIPP panels, the SIPP84 and SIPP90, Zabel (1998) shows that moving between survey waves is strongly positively associated with attrition. Thus, despite the many potential benefits of the SIPP for studying migration described by Hernández-Murillo et al. (2011), the SIPP04 and SIPP08 probably substantially underestimate migration.

Focusing on the  $MPR_{0,1}$  at the tract level in the CCP, slightly more than half (52.3%) of the sample migrated from one tract to another during the observation window. Given that we cannot corroborate this estimate against similar estimates from the NLSY79, NLSY97, PSID, SIPP04, and SIPP08, we took the selection criteria used to calculate the  $MPR_{0,1}$  at the tract level in the CCP and used them to estimate the corresponding state and county  $MPR_{0,1}$

in the CCP to ensure that the latter two estimates were lower than the former. As is evident in Figure 4, the state  $MPR_{0,1}$  is lower than the county  $MPR_{0,1}$ , which, in turn, is lower than the tract  $MPR_{0,1}$ .

In Figure 5, we present estimates of the  $MPR_{0,1}$  for each of three age groups: young adults, family age adults, and older adults.<sup>12</sup> These estimates and their associated standard errors are also provided in tabular form in Appendix Table A4. Recalling our earlier discussion of age patterns of migration as a reflection of the life course (Rogers and Castro 1981), younger adults are more mobile than family age adults, who, in turn, are more mobile than older adults at all geographic levels. For each age group, the estimate of the state  $MPR_{0,1}$  in the PSID is highly similar to the corresponding CCP-equivalent estimate. In contrast, age-specific estimates of the state  $MPR_{0,1}$  in the SIPP04 and SIPP08 are less comparable to their corresponding CCP-equivalent estimates, especially among the most mobile young adults.

Estimates of the  $MPR_{1,2}$  and  $MPR_{2,3}$  at the state, county, and tract levels are displayed in Figure 6. These estimates and their associated standard errors are also provided in Appendix Table A5. Similar to our discussion of Figures 4 and 5, there are two main take-away messages from the estimates displayed in Figure 6. First, the CCP-equivalent estimates are roughly in line with corresponding estimates from the NLSY79, NLSY97, PSID, SIPP04, and SIPP08. Second, any observed discrepancies are likely due to differences in the

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<sup>12</sup> We do not include estimates from the NLSY79 and NLSY97 in Figure 5 because the NLSY is age-limited by design. Those in the NLSY79 were between the ages of 39 and 47 in 2004, and thus a subset of the “family age adults” category. Those in the NLSY97 were between the ages of 20 and 24 in 2004, and thus younger than those in the “young adults” age category.

implementation of these surveys with respect to such features as recording location information, selection, attrition, and more.

At the tract level, 56.8% of individuals in the CCP who had migrated once went on to migrate a second time. Of these, 53.1% went on to migrate a third time. Again, because we cannot corroborate these estimates against similar estimates from the NLSY79, NLSY97, PSID, SIPP04, and SIPP08, we took the selection criteria used to calculate the  $MPR_{1,2}$  and  $MPR_{2,3}$  at the tract level in the CCP and used them to estimate the corresponding state and county  $MPR_{1,2}$  and  $MPR_{2,3}$  in the CCP to ensure that the state estimates were lower than the corresponding county estimates and that the county estimates were lower than the corresponding tract estimates.

Going beyond the set of longitudinal measures of migration proposed by Bernard (2017), we present estimates of the  $RMR_{j,0,T}$  in Figure 7, with corresponding estimates and standard errors provided in tabular form in Appendix Table A6. For each paired comparison, the  $RMR_{j,0,T}$  in the NLSY79, NLSY97, and PSID is higher than the corresponding CCP-equivalent estimate. Having already discussed several potential explanations for these discrepancies, the final step in our analysis is to verify that in the CCP, the tract  $RMR_{j,0,T}$  is lower than the county  $RMR_{j,0,T}$ , which, in turn, is lower than the state  $RMR_{j,0,T}$ . In substantive terms, individuals are much more likely to return to their state and county, and not necessarily their census tract (crudely, their neighborhood) of origin.

As we noted earlier in Section 3, unlike in other datasets, there is less of a tradeoff between geographic and temporal specificity in the CCP. To see this more clearly, following a growing body of research on migration from and to affected areas after extreme weather disasters in the United States (Fussell, Curtis, and DeWaard 2014; Groen and Polivka 2010; Myers, Slack, and Singelmann 2008), we estimate the  $RMR_{j,0,T}$  in the year after the three

costliest hurricanes in US history—in order, these include Hurricanes Katrina, Harvey, and Maria—two of which occurred fairly recently in 2017 (NOAA 2019). For Hurricanes Katrina and Harvey, we consulted the Spatial Hazards Events and Losses Database for the United States (SHELDUS) to select the county that incurred the greatest economic losses from property damage. These counties include Orleans Parish, LA, and Harris County, TX, respectively. For Hurricane Maria, we focused on Puerto Rico as a whole.

In Figure 8, we display the  $RMR_{j,0,T}$  for each county and Puerto Rico one, two, three, and four quarters after Hurricanes Katrina, Harvey, and Maria made landfall in August 2005, August 2017, and September 2017, respectively. In each case, the  $RMR_{j,0,T}$  increased over successive quarters, a finding that is consistent with the three characteristic phases of post-disaster recovery—emergency, restoration, and reconstruction—described by Kates et al. (2006). However, with respect to levels of the  $RMR_{j,0,T}$ , the situation in Puerto Rico clearly differs from the other two cases. This is likely due to the relatively higher cost of migrating from and to Puerto Rico, as well as the lingering effects of Puerto Rico’s economic crisis that began in 2006 and the poorly managed disaster response to Hurricane Maria (Meléndez and Hinojosa 2017; Rodríguez-Díaz 2018; Zorrilla 2017).

In Figure 9, we go one step further. For each case, we display the  $RMR_{j,0,T}$  for two groups of census tracts in the year after each hurricane. Given the importance of storm surge and flooding during and after hurricanes, we define *water tracts* as those with more than 1% water area and distinguish these from *non-water tracts*.<sup>13</sup> In the year after Hurricane Katrina, 40.3% of those who initially resided in a non-water tract and migrated from Orleans Parish returned to Orleans Parish; however, only 31.1% returned to the same tract. Far fewer

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<sup>13</sup> Under this definition and using 2000 census tracts, we classified 56 (31%) of the 181 tracts in Orleans Parish, 165 (25%) of the 649 tracts in Harris County, and 288 (34%) of the 861 tracts in Puerto Rico as water tracts.



returned to Orleans Parish and to a different tract, with most returning to non-water tracts. A similar pattern holds for those who initially resided in a water tract and migrated from and then to Orleans Parish after Hurricane Katrina, as well as for return migration to Harris County after Hurricane Harvey. In contrast, nearly all return migrants to Puerto Rico in the year following Hurricane Maria returned to the same tract: 12.4% and 13.8% who initially resided in non-water and water tracts return to Puerto Rico, respectively, with 11.2% and 11.6% returning to the same tract.

Taken together, the results provided and discussed in this section further establish the comparative utility of the CCP. They also illustrated some of the unique advantages of the CCP with respect to both geographic and temporal specificity.

## **5. Discussion**

In this paper, we provided the first comprehensive comparative assessment of the CCP to demonstrate the utility and unique advantages of these data for research on internal migration in the United States. We did so because the CCP better resolves two persistent problems that plague other cross-sectional and longitudinal data sets (Lee and van der Klaauw 2010; Whitaker 2018). First, because of its very large sample size of about 10 million borrowers each quarter, the CCP requires less of a tradeoff between temporal and geographic specificity, which, in turn, permits portraits of simultaneously regular (down to the quarter) and local (down to the census block of borrowers) migration. Second, the construction of the CCP is such that problems of follow-up and attrition are considerably less severe.

The comparative utility and unique advantages of the CCP warrant greater use of these data in future research on US internal migration. As we briefly showed at the end of the previous section, one area that would particularly benefit from these data is research on migration and population displacement in response to climate and environmental shocks and

corresponding economic effects (Boustan et al. 2017; Curtis, Fussell, and DeWaard 2015; Fussell, Hunter, and Gray 2014; Gallagher and Hartley 2017; Groen and Polivka 2010; Hunter, Luna, and Norton 2015; Myers, Slack, and Singelmann 2008; Tran and Sheldon 2018). Specifically, the CCP affords researchers the opportunity to study the demographic and economic implications of both rapid and slow-onset shocks at different time intervals and spatial scales. The CCP data are also available up to the most recent quarter, which makes it particularly well-suited for studying very recent shocks such as Hurricanes Florence and Michael in the fall of 2018, as well as other types of shocks such as the Mendocino Complex wildfire in California earlier that summer. The large sample size of the CCP also gives it great advantage over smaller longitudinal data sets. The small sample size of data sets like the NLSYs and PSID limits their usefulness in the study of individual migration dynamics over time, since individuals move relatively infrequently over their lifetimes. For example, future work could also use the CCP to examine differences in migration and return migration patterns by age, as well as other characteristics provided in the CCP data or merged from other datasets.

In pursuing this and other research, it is important to also keep in mind the many weaknesses of the CCP. Bracketing the issue of accessibility given the proprietary nature of these data, perhaps the greatest weakness of the CCP, especially in the context of studying climate and environmental shocks, is that the CCP is a sample of relatively older and more financially established adults. Relative to younger and less financially established adults, those in the CCP not only have more resources at their disposal to adapt to climate and environmental shocks in situ, but they can also use these resources to overcome the sometimes prohibitive costs of migration that might trap others in place (Black et al. 2011; Bodvarsson and Van den Berg 2013).

The above limitations notwithstanding, the central contribution of this paper is to provide a much needed introduction to the CCP and a comprehensive comparative point of reference. The CCP data are a valuable and underutilized resource for studying US internal migration. While our effort here is descriptive, we hope that our work in this paper will help to stimulate future efforts to use this data. In the process, we hope that our work also helps to continue important conversations about [improving] the availability, quality, and comparability of migration data more generally. As several recently published high-level papers and books on the state of migration research have argued (Raymer, Willekens, and Rogers 2018; White 2016; Willekens et al. 2016), the future of migration research and its intersections with the work of policymakers and practitioners is very much bound up with the availability, quality, and comparability of migration data. Data on internal migration in the United States are no exception.

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**Table 1. Descriptions of Cross-Sectional Data Sets**

<b>Dataset</b>	<b>Universe</b>	<b>Sample Size</b>	<b>Time Span</b>	<b>Unit of Observation</b>	<b>Migration Information</b>	<b>Selection Criteria for Analysis</b>
FRBNY/ Equifax Consumer Credit Panel (CCP)	US resident population with a credit report and Social Security number	10 million per year	Quarterly from 1999- 2018; annual migration measures use location in the first quarter	Individual	Based on previous and current addresses on credit reports.	Prior location determined by linking records with a unique individual identifier. Excludes individuals living in US territories, without a valid birth year, and/or with implied ages above 105.
American Community Survey (ACS)	US resident population	3 million per year	Annually from 2005- 2016	Individual	Contains questions on last year's place of residence and on whether one moved in past year.	Excludes individuals residing in group quarters, those who reported living abroad last year, and/or those less than one year old.
Current Population Survey (CPS)	US civilian non- institutionalized population	100,000 per year	Annually from 1963- 2018 <sup>a</sup>	Individual	Contains question asked in March on whether one moved in past calendar year and whether move was within county, between counties in same state, or between states.	Excludes individuals residing in group quarters, those who reported living abroad last year, those less than one year old, and/or those with imputed migration status.
Internal Revenue Service (IRS)	US tax-filing population	Not a sample	Annually from 1990-91 to 2015-16 <sup>b</sup>	State and county <sup>c</sup>	Based on previous and current addresses on tax returns. <sup>c</sup>	Excludes flows from and/or to outside of the United States, including US territories.

Notes: <sup>a</sup> Migration data not available for all years. <sup>b</sup> Years correspond to consecutive tax-filing years; hereafter, we refer to each two-year period by first tax-filing year. <sup>c</sup> IRS provides only aggregated state- and county-level migration data.

**Table 2. Descriptions of Longitudinal Data Sets**

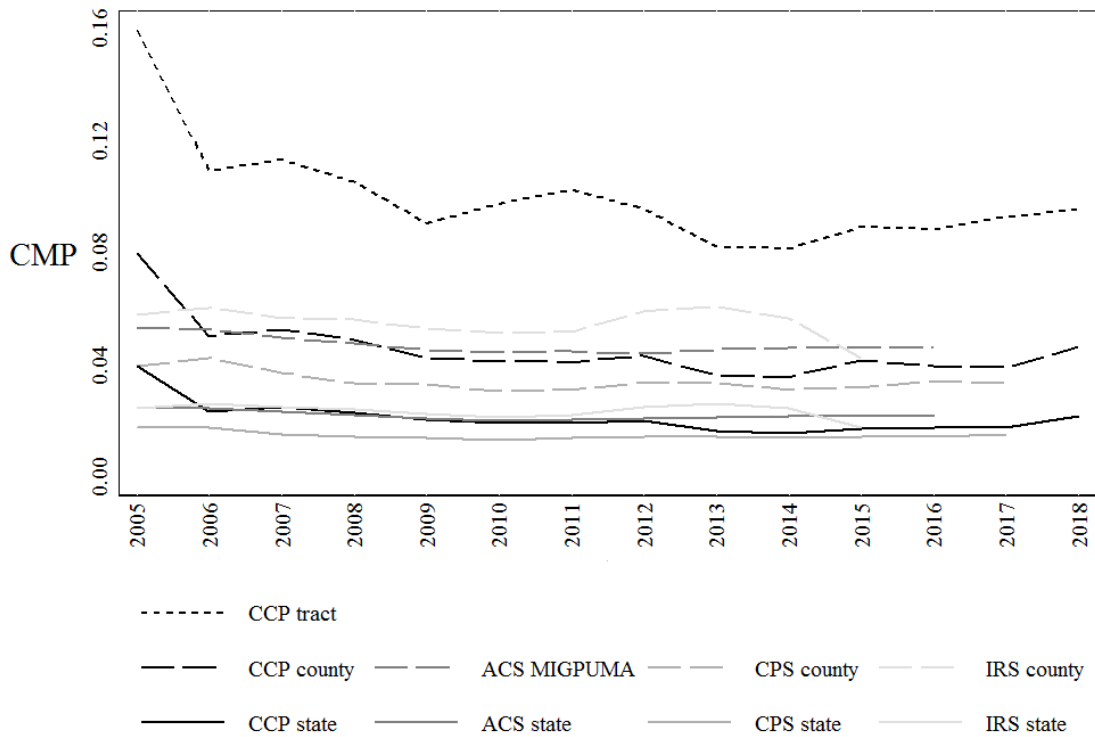
<b>Dataset</b>	<b>Universe</b>	<b>Sample Size</b>	<b>Time Span</b>	<b>Unit of Observation</b>	<b>Migration Information</b>	<b>Selection Criteria for Analysis</b>
National Longitudinal Survey of Youth, 1979 Cohort (NLSY79)	American youth born between 1957 and 1964	12,686 in first round	1979-2014	Individual	State and county of residence at date of interview, annually until 1994, and biennially thereafter	All individuals age 39-47 as of January 2004 with non-missing location information through 2014 interview; location measured as of biennial interview date from January 2004-December 2014.
National Longitudinal Survey of Youth, 1997 Cohort (NLSY97)	American youth born between 1980 and 1984	8,984 in first round	1997-2016	Individual	State and county of residence at date of interview, annually until 2011, and biennially thereafter	All individuals age 20-24 as of January 2004 with non-missing location information through 2016 interview; location measured as of biennial interview date from January 2004-June 2016.
Panel Survey of Income Dynamics (PSID)	US families in 1968 and their descendants. Immigrants added in 1997 and 1999.	32,393 individuals in 2015	1968-2015	Individual	State of residence annually until 2003 and biennially thereafter	All individuals with non-missing location information in all biennial interviews from 2005-2015, inclusive.
Survey of Income and Program Participation, 2004 Panel (SIPP04)	US civilian non-institutionalized population	106,611 individuals in March 2004	2004-2007	Individual	Monthly state of residence	All individuals with non-missing location information from March 2004-March 2007, location measured as of last month of quarter (March, June, September, December)
Survey of Income and Program Participation, 2008 Panel (SIPP08)	US civilian non-institutionalized population	85,723 individuals in September 2008	2008-2013	Individual	Monthly state of residence	All individuals with non-missing location information from September 2008-June 2013, location measured as of last month of quarter (March, June, September, December)

**Table 3. Attrition Rates and Coverage Ratios in FRBNY/Equifax Consumer Credit Panel, National Longitudinal Survey of Youth (1979 and 1997 Cohorts), Panel Study of Income Dynamics, and Survey of Income and Program Participation (2004 and 2008)**

	Attrition Rate	Coverage Ratio
<b>CCP</b>	0.051	0.819
<b>NLSY79</b>	0.220	0.920
<b>NLSY97</b>	0.265	0.862
<b>PSID</b>	0.319	0.900
<b>SIPP04</b>	0.742	0.665
<b>SIPP08</b>	0.783	0.585

*Notes:* CCP = FRBNY/Equifax Consumer Credit Panel; NLSY79 = National Longitudinal Survey of Youth, 1979 Cohort; NLSY97 = National Longitudinal Survey of Youth, 1997 Cohort; PSID = Panel Study of Income Dynamics; SIPP04 = Survey of Income and Program Participation 2004; SIPP08 = Survey of Income and Program Participation 2008. Attrition rate is fraction of sample at beginning of observation period with incomplete location histories through end of period. Coverage ratio is fraction of sample at end of observation period with complete histories back to beginning of period. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015; locations are derived from current mailing addresses reported by lenders to Equifax. NLSY79 sample contains all individuals age 39-47 as of January 2004 with non-missing migration information through 2014 interview; location measured as of biennial interview date from January 2004-December 2014. NLSY97 sample contains all individuals age 20-24 as of January 2004 with non-missing migration information through 2016 interview; location measured as of biennial interview date from January 2004-June 2016. PSID observation period spans 2005-2015; location measured biennially. SIPP04 observation period spans March 2004-March 2007; location measured quarterly. SIPP08 observation period spans September 2008-September 2013; location measured quarterly.

**Figure 1. Annual Crude Migration Probability of US Internal Migration at State, County, and Tract Levels since 2005 in FRBNY/Equifax Consumer Credit Panel, American Community Survey, Current Population Survey, and Internal Revenue Service Data**

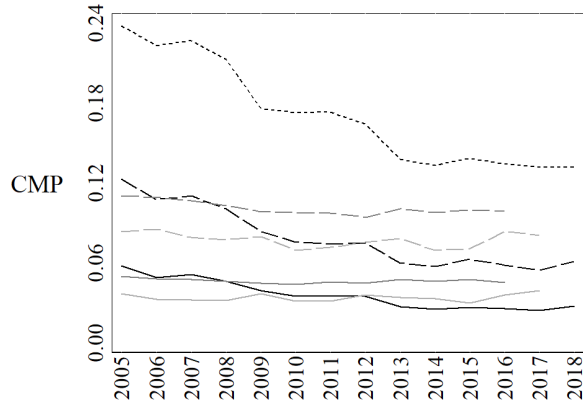


*Notes:* Selection criteria for analysis provided in Table 1. CMP = Crude Migration Probability; CCP = FRBNY/Equifax Consumer Credit Panel; ACS = American Community Survey; CPS = Current Population Survey; IRS = Internal Revenue Service; MIGPUMA = Public Use Microdata Area for Migration. CCP, ACS, and CPS estimates are weighted.

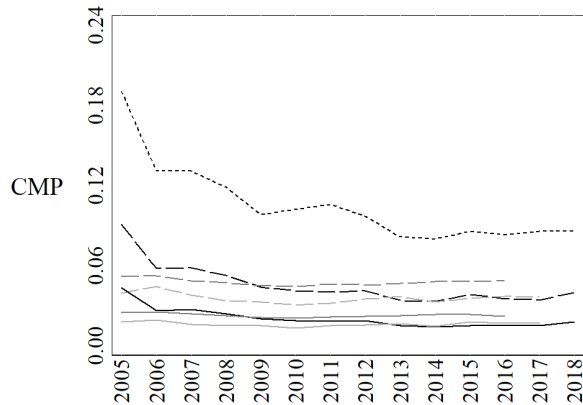


**Figure 2. Annual Crude Migration Probability of US Internal Migration by Age Group at State, County, and Tract Levels since 2005 in FRBNY/Equifax Consumer Credit Panel, American Community Survey, Current Population Survey**

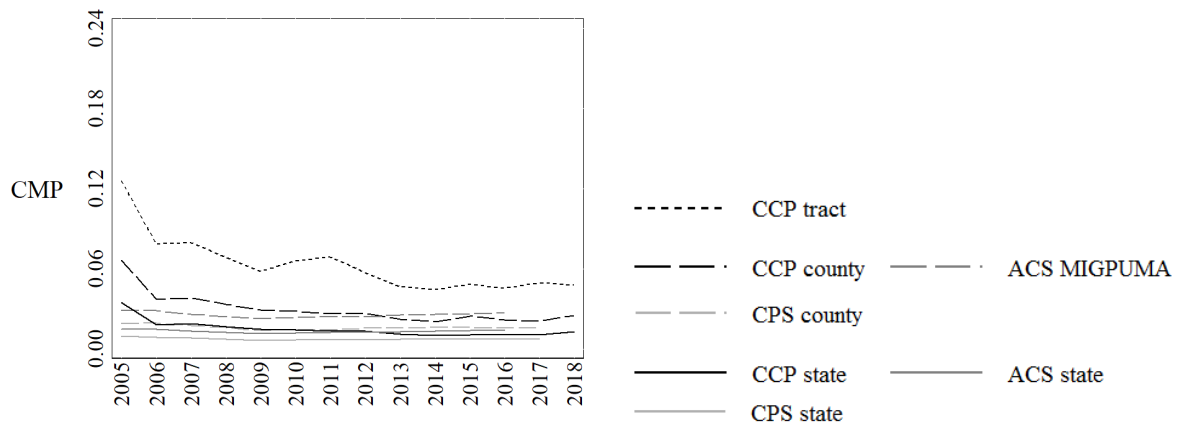
**Panel A. Young Adults (Age 25-29)**



**Panel B. Family Age Adults (Age 30-49)**



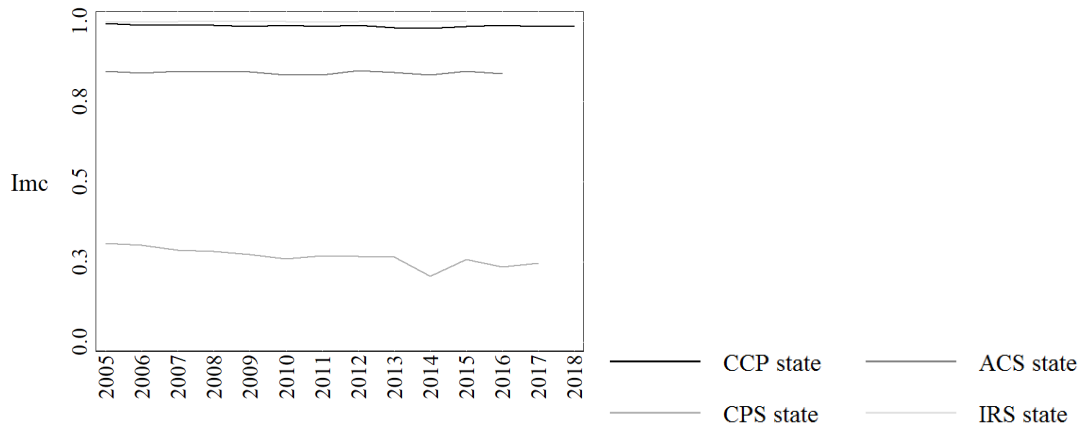
**Panel C. Older Adults (Age 50-74)**



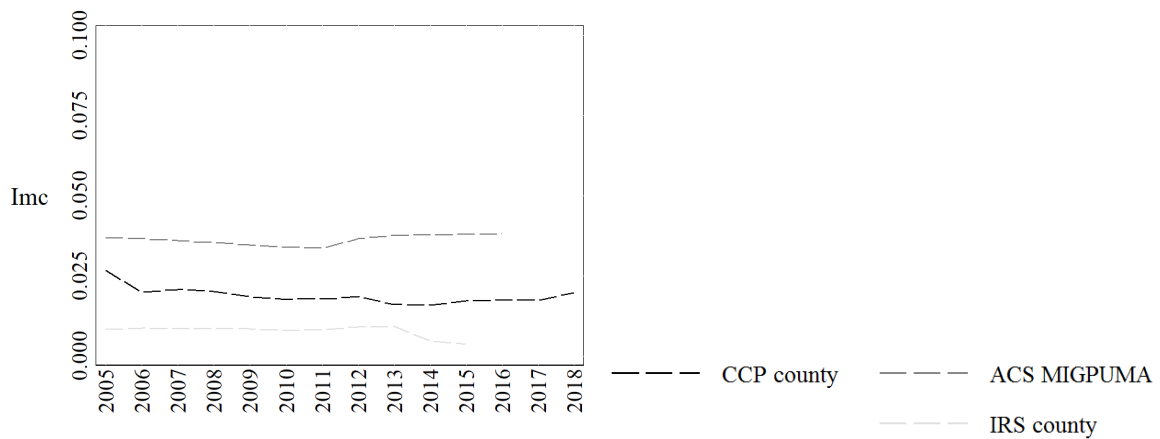
*Notes:* Selection criteria for analysis provided in Table 1. For ease of display, scales of y-axes differ from that in Figure 1. CMP = Crude Migration Probability; CCP = FRBNY/Equifax Consumer Credit Panel; ACS = American Community Survey; CPS = Current Population Survey; MIGPUMA = Public Use Microdata Area for Migration. CCP, ACS, and CPS estimates are weighted.

**Figure 3. Annual Index of Migration Connectivity of US Internal Migration at State, County, and Tract Levels since 2005 in FRBNY/Equifax Consumer Credit Panel, American Community Survey, Current Population Survey, and Internal Revenue Service Data**

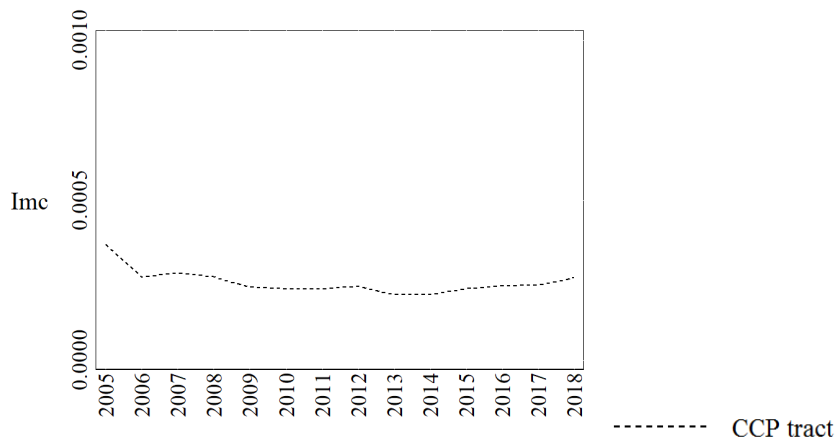
**Panel A. State**



**Panel B. County**

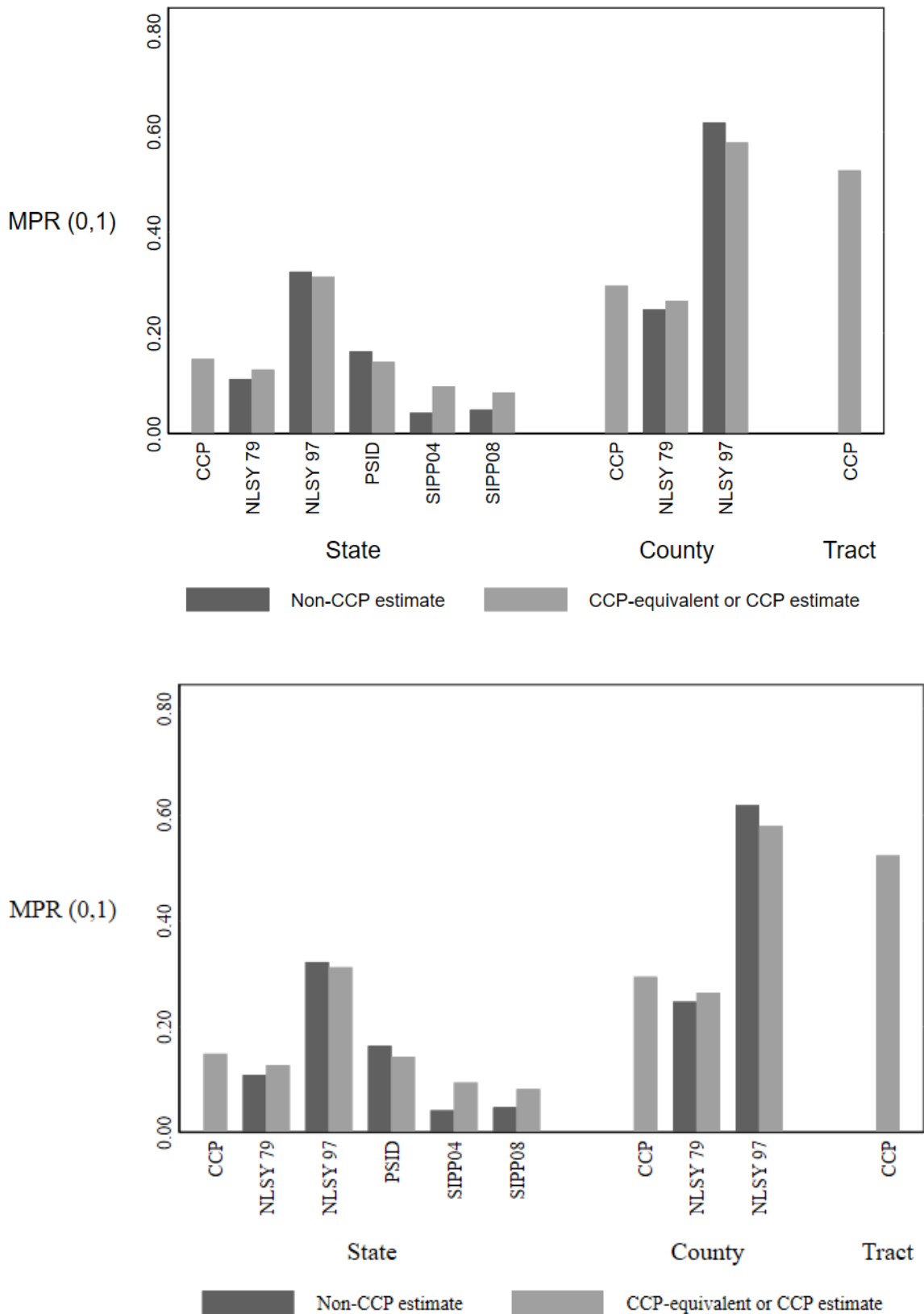


**Panel C. Tract**



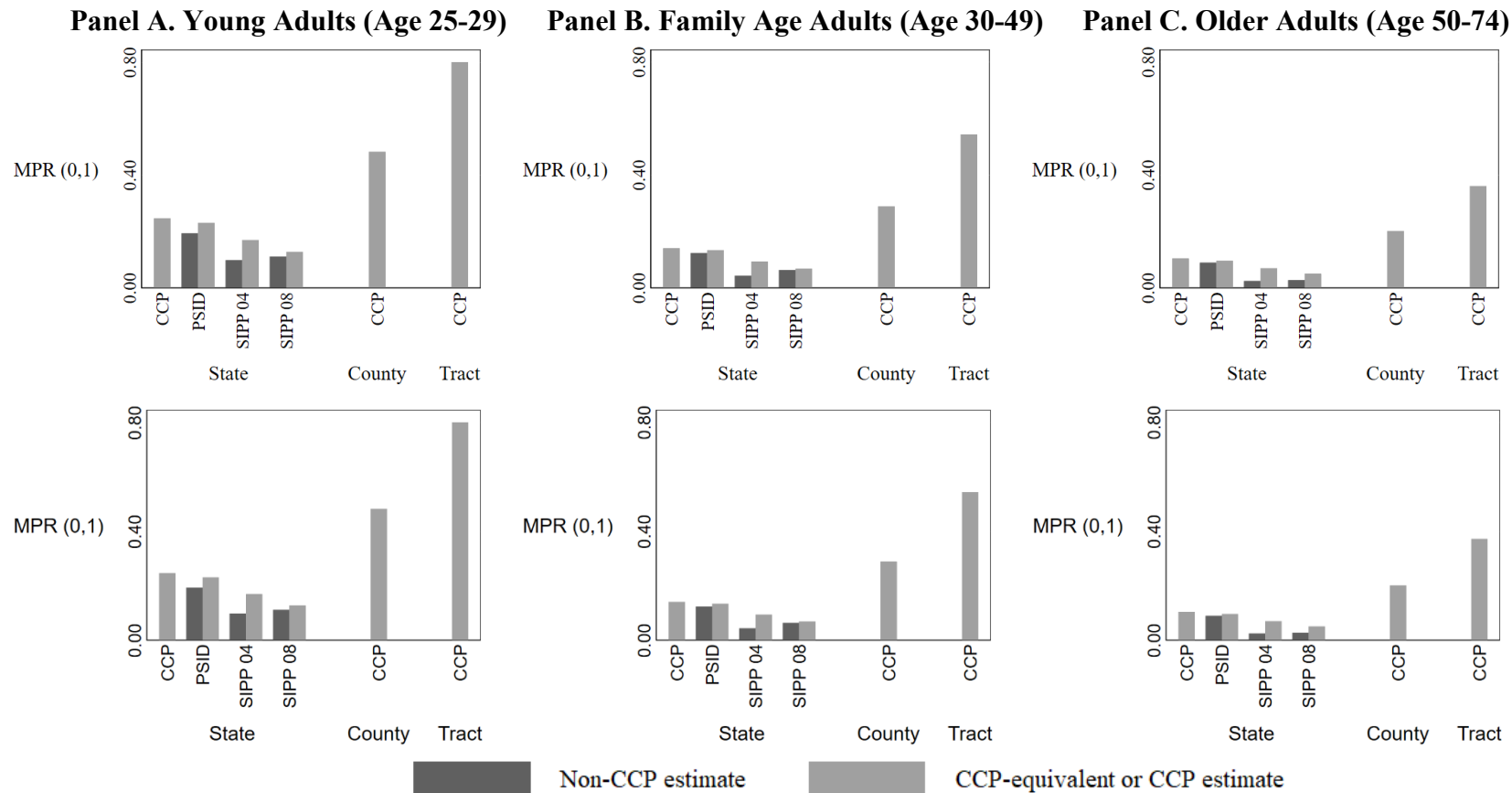
*Notes:* Selection criteria for analysis provided in Table 1. For ease of display, scales of y-axes differ across panels.  $I_{mc}$  = Index of Migration Connectivity; CCP = FRBNY/Equifax Consumer Credit Panel; ACS = American Community Survey; CPS = Current Population Survey; IRS = Internal Revenue Service; MIGPUMA = Public Use Microdata Area for Migration. CCP, ACS, and CPS estimates are weighted.

**Figure 4. Migration Progression Ratio of First US Internal Migration at State, County, and Tract Levels in FRBNY/Equifax Consumer Credit Panel, National Longitudinal Survey of Youth (1979 and 1997 Cohorts), Panel Study of Income Dynamics, and Survey of Income and Program Participation (2004 and 2008)**



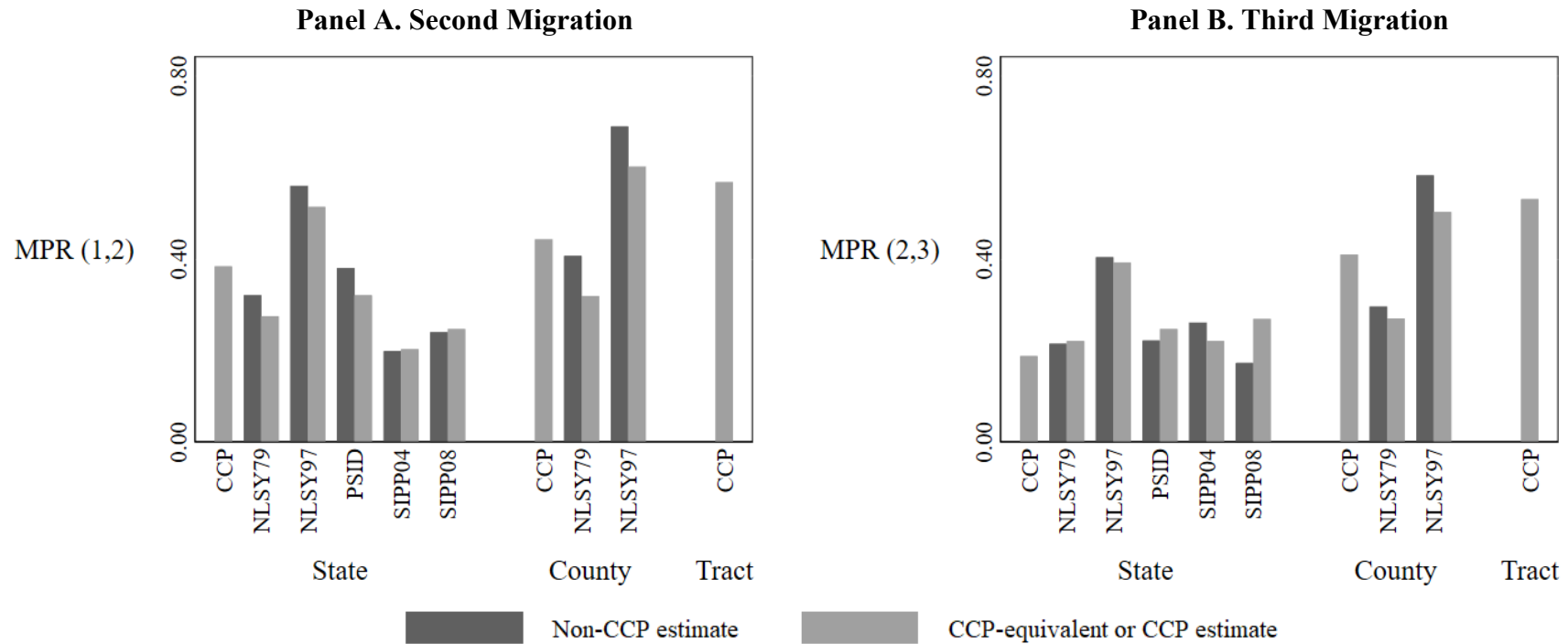
*Notes:* Selection criteria for analysis provided in Table 2.  $MPR(0,1)$  = Migration Progression Ratio of first migration; CCP = FRBNY/Equifax Consumer Credit Panel; NLSY79 = National Longitudinal Survey of Youth, 1979 Cohort; NLSY97 = National Longitudinal Survey of Youth, 1997 Cohort; PSID = Panel Study of Income Dynamics; SIPP04 = Survey of Income and Program Participation 2004; SIPP08 = Survey of Income and Program Participation 2008. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015; locations are derived from current mailing addresses reported by lenders to Equifax. NLSY79 sample contains all individuals age 39-47 as of January 2004 with non-missing migration information through 2014 interview; location measured as of biennial interview date from January 2004-December 2014. NLSY97 sample contains all individuals age 20-24 as of January 2004 with non-missing migration information through 2016 interview; location measured as of biennial interview date from January 2004-June 2016. PSID observation period spans 2005-2015; location measured biennially. SIPP04 observation period spans March 2004-March 2007; location measured quarterly. SIPP08 observation period spans September 2008-September 2013; location measured quarterly.

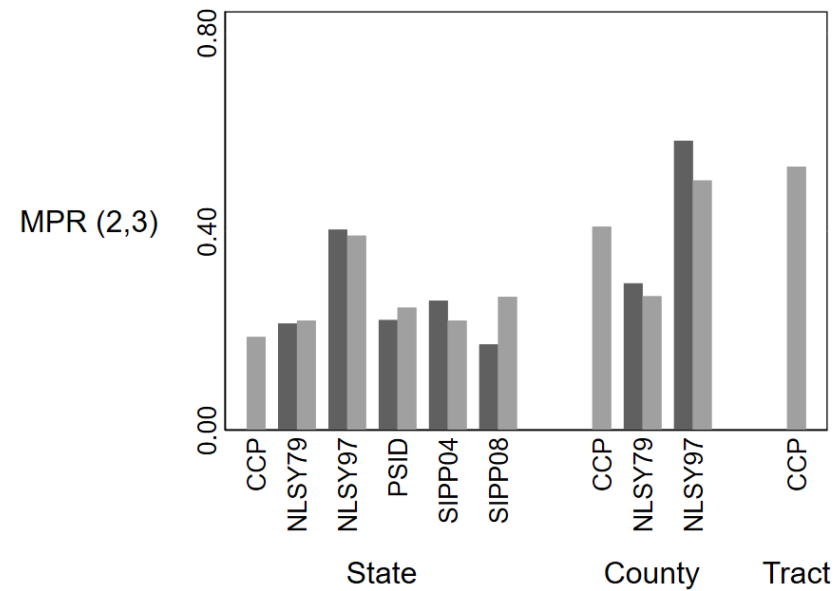
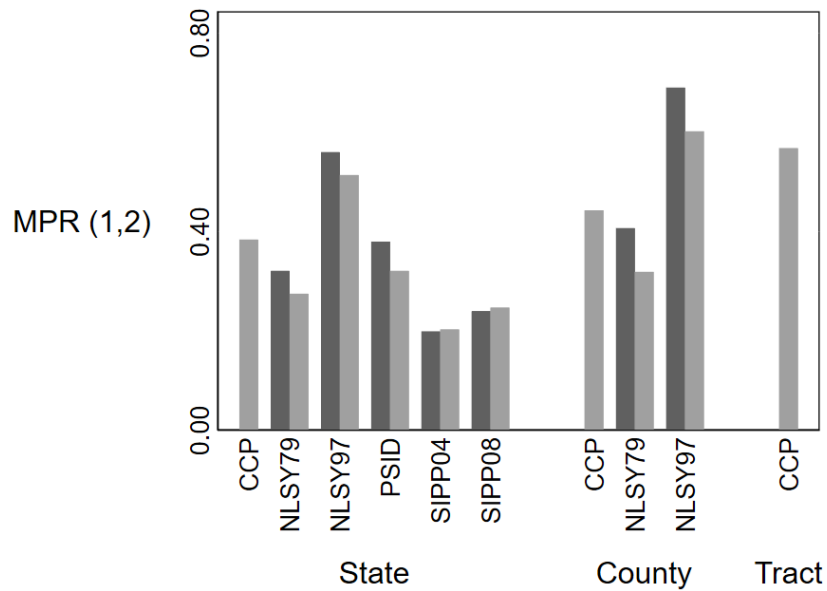
**Figure 5. Migration Progression Ratio of First US Internal Migration by Age Group at State, County, and Tract Levels in the FRBNY/Equifax Consumer Credit Panel and the Panel Study of Income Dynamics**



*Notes:* Selection criteria for analysis provided in Table 2. MPR(0,1) = Migration Progression Ratio of first migration; CCP = FRBNY/Equifax Consumer Credit Panel; NLSY79 = National Longitudinal Survey of Youth, 1979 Cohort; NLSY97 = National Longitudinal Survey of Youth, 1997 Cohort; PSID = Panel Study of Income Dynamics; SIPP04 = Survey of Income and Program Participation 2004; SIPP08 = Survey of Income and Program Participation 2008. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015; locations are derived from current mailing addresses reported by lenders to Equifax. PSID observation period spans 2005-2015; location measured biennially.

**Figure 6. Migration Progression Ratios of Second and Third US Internal Migration at State, County, and Tract Levels in FRBNY/Equifax Consumer Credit Panel, National Longitudinal Survey of Youth (1979 and 1997 Cohorts), Panel Study of Income Dynamics, and Survey of Income and Program Participation (2004 and 2008)**

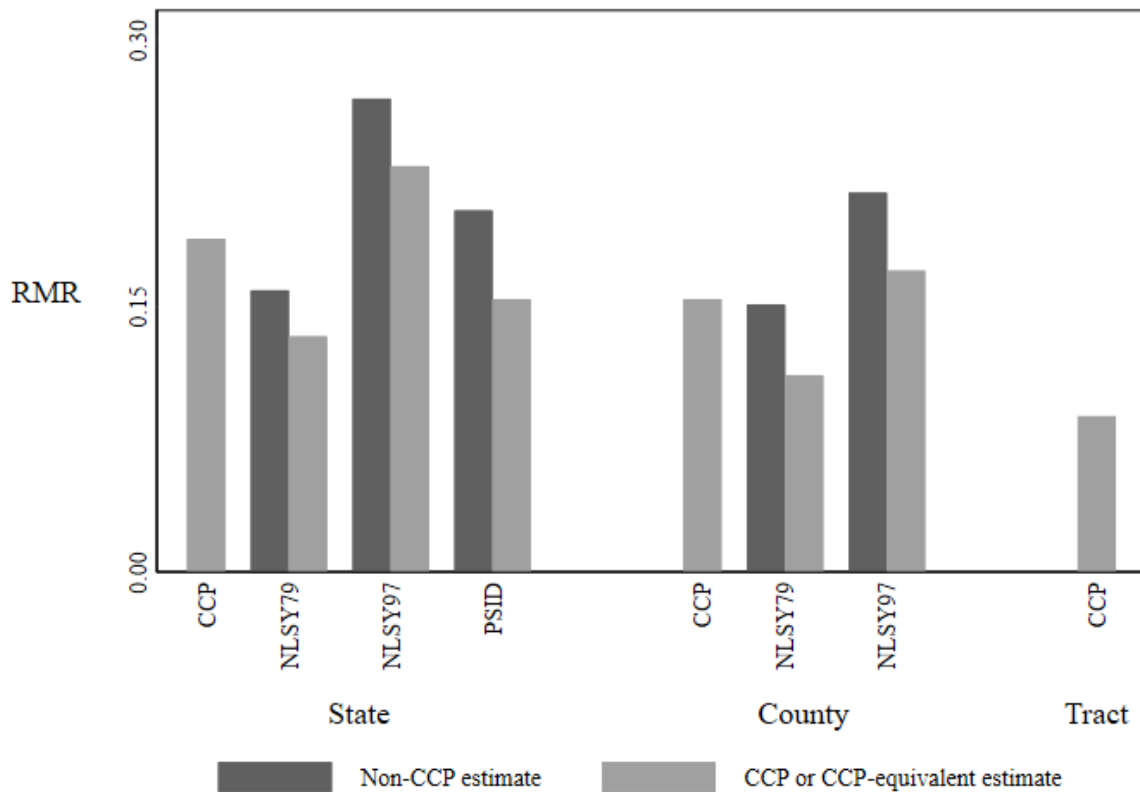




Non-CCP estimate
  CCP-equivalent or CCP estimate

*Notes:* Selection criteria for analysis provided in Table 2. MPR(1,2) = Migration Progression Ratio of second migration; MPR(2,3) = Migration Progression Ratio of third migration; CCP = FRBNY/Equifax Consumer Credit Panel; NLSY79 = National Longitudinal Survey of Youth, 1979 Cohort; NLSY97 = National Longitudinal Survey of Youth, 1997 Cohort; PSID = Panel Study of Income Dynamics; SIPP04 = Survey of Income and Program Participation 2004; SIPP08 = Survey of Income and Program Participation 2008. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015; locations are derived from current mailing addresses reported by lenders to Equifax. NLSY79 sample contains all individuals age 39-47 as of January 2004 with non-missing migration information through 2014 interview; location measured as of biennial interview date from January 2004-December 2014. NLSY97 sample contains all individuals age 20-24 as of January 2004 with non-missing migration information through 2016 interview; location measured as of biennial interview date from January 2004-June 2016. PSID observation period spans 2005-2015; location measured biennially. SIPP04 observation period spans March 2004-March 2007; location measured quarterly. SIPP08 observation period spans September 2008-September 2013; location measured quarterly.

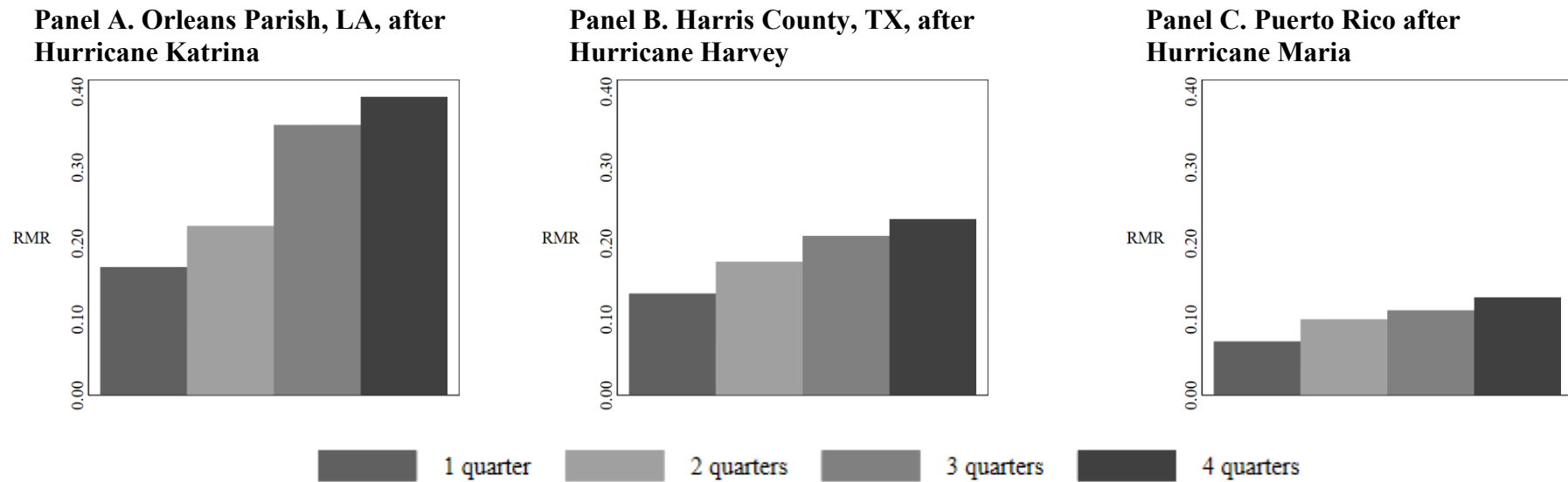
**Figure 7. Return Migration Ratio of US Internal Migration at State, County, and Tract Levels in FRBNY/Equifax Consumer Credit Panel, National Longitudinal Survey of Youth (1979 and 1997 Cohorts), and Panel Study of Income Dynamics**



*Notes:* Selection criteria for analysis provided in Table 2. RMR = Return Migration Ratio; CCP = FRBNY/Equifax Consumer Credit Panel; NLSY79 = National Longitudinal Survey of Youth, 1979 Cohort; NLSY97 = National Longitudinal Survey of Youth, 1997 Cohort; PSID = Panel Study of Income Dynamics. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015; locations are derived from current mailing addresses reported by lenders to Equifax. NLSY79 sample contains all individuals age 39-47 as of January 2004 with non-missing migration information through 2014 interview; location measured as of biennial interview date from January 2004-December 2014. NLSY97 sample contains all individuals age 20-24 as of January 2004 with non-missing migration information through 2016 interview; location measured as of biennial interview date from January 2004-June 2016. PSID observation period spans 2005-2015; location measured biennially.

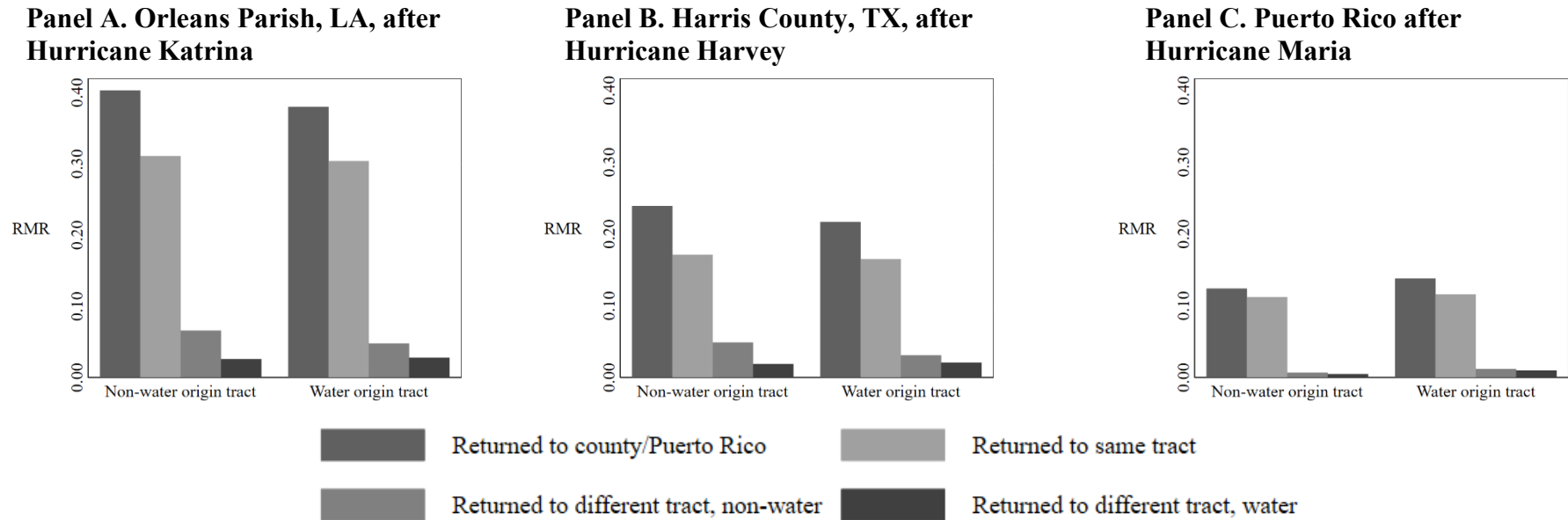


**Figure 8. Return Migration Ratio by Quarter for Selected Disaster-Affected Areas after the Three Costliest Hurricanes in US History**



*Notes:* The return migration ratio is the fraction of those who resided in the disaster-affected area in the quarter prior to the hurricane and migrated from the area in the quarter when the hurricane made landfall (2008-Q3 for Hurricane Katrina and 2017-Q3 for Hurricanes Harvey and Maria) who migrated to the area in the quarter shown in each of the panels.

**Figure 9. One-Year Return Migration Ratio for Non-Water and Water Tracts in Selected Disaster-Affected Areas and after the Three Costliest Hurricanes in US History**



*Notes:* The return migration ratio is the fraction of those who resided in the disaster-affected area in the quarter prior to the hurricane and migrated from the area in the quarter when the hurricane made landfall (2008-Q3 for Hurricane Katrina and 2017-Q3 for Hurricanes Harvey and Maria) who migrated to the area in the year after the hurricane. Water tracts are defined as those with more than 1% water area within their boundaries. All other tracts are defined as non-water tracts.

**Table A1. Estimates and Standard Errors of Annual Crude Migration Probability of US Internal Migration at State, County, and Tract Levels since 2005 in FRBNY/Equifax Consumer Credit Panel, American Community Survey, and Current Population Survey**

	State			County/MIGPUMA			Tract
	CCP	ACS	CPS	CCP	ACS	CPS	CCP
<b>2005</b>	0.0479 (0.0001)	0.0251 (0.0001)	0.0181 (0.0004)	0.0975 (0.0001)	0.0532 (0.0002)	0.0400 (0.0006)	0.1946 (0.0001)
<b>2006</b>	0.0292 (0.0001)	0.0249 (0.0001)	0.0179 (0.0004)	0.0628 (0.0001)	0.0530 (0.0002)	0.0427 (0.0006)	0.1348 (0.0001)
<b>2007</b>	0.0308 (0.0001)	0.0235 (0.0001)	0.0157 (0.0004)	0.0655 (0.0001)	0.0499 (0.0002)	0.0375 (0.0006)	0.1396 (0.0001)
<b>2008</b>	0.0282 (0.0001)	0.0225 (0.0001)	0.0148 (0.0004)	0.0604 (0.0001)	0.0480 (0.0002)	0.0337 (0.0005)	0.1289 (0.0001)
<b>2009</b>	0.0248 (<0.0001)	0.0211 (0.0001)	0.0145 (0.0004)	0.0521 (0.0001)	0.0456 (0.0002)	0.0333 (0.0005)	0.1102 (0.0001)
<b>2010</b>	0.0230 (<0.0001)	0.0205 (0.0001)	0.0134 (0.0003)	0.0488 (0.0001)	0.0448 (0.0002)	0.0310 (0.0005)	0.1123 (0.0001)
<b>2011</b>	0.0229 (<0.0001)	0.0209 (0.0001)	0.0144 (0.0004)	0.0481 (0.0001)	0.0450 (0.0002)	0.0316 (0.0005)	0.1156 (0.0001)
<b>2012</b>	0.0238 (<0.0001)	0.0211 (0.0001)	0.0149 (0.0004)	0.0500 (0.0001)	0.0443 (0.0002)	0.0339 (0.0006)	0.1096 (0.0001)
<b>2013</b>	0.0192 (<0.0001)	0.0218 (0.0001)	0.0149 (0.0004)	0.0418 (0.0001)	0.0457 (0.0002)	0.0341 (0.0006)	0.0944 (0.0001)
<b>2014</b>	0.0186 (<0.0001)	0.0221 (0.0001)	0.0141 (0.0005)	0.0413 (0.0001)	0.0463 (0.0002)	0.0315 (0.0007)	0.0943 (0.0001)
<b>2015</b>	0.0202 (<0.0001)	0.0223 (0.0001)	0.0149 (0.0004)	0.0445 (0.0001)	0.0463 (0.0002)	0.0323 (0.0006)	0.0990 (0.0001)
<b>2016</b>	0.0205 (<0.0001)	0.0221 (0.0001)	0.0149 (0.0004)	0.0455 (0.0001)	0.0464 (0.0002)	0.0345 (0.0006)	0.1012 (0.0001)
<b>2017</b>	0.0203 (<0.0001)		0.0156 (0.0004)	0.0451 (0.0001)		0.0336 (0.0006)	0.1052 (0.0001)
<b>2018</b>	0.0245 (<0.0001)			0.0526 (0.0001)			0.1073 (0.0001)

*Notes:* Selection criteria for analysis provided in Table 1. CCP = FRBNY/Equifax Consumer Credit Panel; ACS = American Community Survey; CPS = Current Population Survey. Because of data limitations, county ACS estimates reflect Public Use Microdata Areas for Migration (MIGPUMAs), not counties. CCP, ACS, and CPS estimates are weighted.

**Table A2. Estimates and Standard Errors of Annual Crude Migration Probability of US Internal Migration by Age Group at State, County, and Tract Levels since 2005 in FRBNY/Equifax Consumer Credit Panel, American Community Survey, and Current Population Survey**

**Panel A. Young Adults (Age 25-29)**

	State			County/MIGPUMA			Tract
	CCP	ACS	CPS	CCP	ACS	CPS	CCP
<b>2005</b>	0.0829 (0.0003)	0.0502 (0.0007)	0.0371 (0.0024)	0.1774 (0.0004)	0.1106 (0.0010)	0.0836 (0.0035)	0.3423 (0.0005)
<b>2006</b>	0.0570 (0.0003)	0.0485 (0.0007)	0.0331 (0.0021)	0.1261 (0.0004)	0.1094 (0.0010)	0.0857 (0.0034)	0.2586 (0.0005)
<b>2007</b>	0.0615 (0.0003)	0.0480 (0.0007)	0.0324 (0.0021)	0.1340 (0.0004)	0.1069 (0.0010)	0.0793 (0.0033)	0.2710 (0.0005)
<b>2008</b>	0.0589 (0.0003)	0.0463 (0.0007)	0.0320 (0.0021)	0.1296 (0.0004)	0.1033 (0.0010)	0.0776 (0.0032)	0.2653 (0.0005)
<b>2009</b>	0.0523 (0.0002)	0.0449 (0.0006)	0.0370 (0.0022)	0.1130 (0.0003)	0.0988 (0.0009)	0.0801 (0.0032)	0.2305 (0.0004)
<b>2010</b>	0.0491 (0.0002)	0.0440 (0.0006)	0.0316 (0.0020)	0.1065 (0.0003)	0.0979 (0.0009)	0.0699 (0.0030)	0.2272 (0.0004)
<b>2011</b>	0.0512 (0.0002)	0.0458 (0.0007)	0.0314 (0.0021)	0.1089 (0.0003)	0.0975 (0.0010)	0.0719 (0.0031)	0.2318 (0.0005)
<b>2012</b>	0.0541 (0.0002)	0.0450 (0.0007)	0.0364 (0.0023)	0.1155 (0.0003)	0.0946 (0.0009)	0.0757 (0.0033)	0.2337 (0.0005)
<b>2013</b>	0.0438 (0.0002)	0.0480 (0.0007)	0.0346 (0.0022)	0.0971 (0.0003)	0.1009 (0.0009)	0.0784 (0.0034)	0.2060 (0.0004)
<b>2014</b>	0.0436 (0.0002)	0.0465 (0.0006)	0.0333 (0.0029)	0.0982 (0.0003)	0.0982 (0.0009)	0.0697 (0.0040)	0.2085 (0.0004)
<b>2015</b>	0.0479 (0.0002)	0.0478 (0.0007)	0.0301 (0.0021)	0.1059 (0.0003)	0.0999 (0.0009)	0.0709 (0.0033)	0.2193 (0.0004)
<b>2016</b>	0.0479 (0.0002)	0.0457 (0.0006)	0.0361 (0.0026)	0.1072 (0.0003)	0.0988 (0.0009)	0.0840 (0.0038)	0.2220 (0.0004)
<b>2017</b>	0.0478 (0.0002)		0.0395 (0.0026)	0.1066 (0.0003)		0.0808 (0.0036)	0.2262 (0.0005)
<b>2018</b>	0.0580 (0.0003)			0.1242 (0.0004)			0.2374 (0.0005)

*Notes:* Selection criteria for analysis provided in Table 1. CCP = FRBNY/Equifax Consumer Credit Panel; ACS = American Community Survey; CPS = Current Population Survey. Because of data limitations, county ACS estimates reflect Public Use Microdata Areas for Migration (MIGPUMAs), not counties. CCP, ACS, and CPS estimates are weighted.

**Panel B. Family Age (Age 30-49)**

	State			County/MIGPUMA			Tract
	CCP	ACS	CPS	CCP	ACS	CPS	CCP
<b>2005</b>	0.0472 (0.0001)	0.0248 (0.0002)	0.0181 (0.0007)	0.0987 (0.0002)	0.0518 (0.0003)	0.0396 (0.0011)	0.2095 (0.0002)
<b>2006</b>	0.0300 (0.0001)	0.0255 (0.0002)	0.0192 (0.0008)	0.0652 (0.0001)	0.0526 (0.0003)	0.0445 (0.0012)	0.1480 (0.0002)
<b>2007</b>	0.0321 (0.0001)	0.0241 (0.0002)	0.0161 (0.0007)	0.0688 (0.0001)	0.0490 (0.0003)	0.0382 (0.0011)	0.1546 (0.0002)
<b>2008</b>	0.0298 (0.0001)	0.0229 (0.0002)	0.0154 (0.0007)	0.0643 (0.0001)	0.0474 (0.0003)	0.0337 (0.0010)	0.1448 (0.0002)
<b>2009</b>	0.0264 (0.0001)	0.0214 (0.0002)	0.0153 (0.0007)	0.0560 (0.0001)	0.0451 (0.0003)	0.0331 (0.0010)	0.1248 (0.0002)
<b>2010</b>	0.0249 (0.0001)	0.0206 (0.0002)	0.0134 (0.0006)	0.0538 (0.0001)	0.0446 (0.0003)	0.0307 (0.0010)	0.1298 (0.0002)
<b>2011</b>	0.0260 (0.0001)	0.0220 (0.0002)	0.0155 (0.0007)	0.0554 (0.0001)	0.0463 (0.0003)	0.0321 (0.0011)	0.1369 (0.0002)
<b>2012</b>	0.0275 (0.0001)	0.0222 (0.0002)	0.0157 (0.0007)	0.0589 (0.0001)	0.0457 (0.0003)	0.0353 (0.0011)	0.1350 (0.0002)
<b>2013</b>	0.0227 (0.0001)	0.0226 (0.0002)	0.0165 (0.0007)	0.0506 (0.0001)	0.0467 (0.0003)	0.0369 (0.0011)	0.1202 (0.0002)
<b>2014</b>	0.0233 (0.00006)	0.0235 (0.0002)	0.0147 (0.0009)	0.0527 (0.0001)	0.0481 (0.0003)	0.0329 (0.0013)	0.1247 (0.0002)
<b>2015</b>	0.0262 (0.0001)	0.0238 (0.0002)	0.0179 (0.0009)	0.0582 (0.0001)	0.0485 (0.0003)	0.0358 (0.0012)	0.1332 (0.0002)
<b>2016</b>	0.0267 (0.0001)	0.0237 (0.0002)	0.0170 (0.0009)	0.0601 (0.0001)	0.0486 (0.0003)	0.0373 (0.0012)	0.1379 (0.0002)
<b>2017</b>	0.0268 (0.0001)		0.0176 (0.0008)	0.0601 (0.0001)		0.0367 (0.0012)	0.1428 (0.0002)
<b>2018</b>	0.0325 (0.0001)			0.0705 (0.0001)			0.1491 (0.0002)

*Notes:* Selection criteria for analysis provided in Table 1. CCP = FRBNY/Equifax Consumer Credit Panel; ACS = American Community Survey; CPS = Current Population Survey. Because of data limitations, county ACS estimates reflect Public Use Microdata Areas for Migration (MIGPUMAs), not counties. CCP, ACS, and CPS estimates are weighted.

**Panel C. Older Adults (Age 50-74)**

	State			County/MIGPUMA			Tract
	CCP	ACS	CPS	CCP	ACS	CPS	CCP
<b>2005</b>	0.0381 (0.0001)	0.0150 (0.0002)	0.0099 (0.0006)	0.0720 (0.0001)	0.0286 (0.0003)	0.0190 (0.0009)	0.1380 (0.0002)
<b>2006</b>	0.0200 (0.0001)	0.0149 (0.0002)	0.0086 (0.0006)	0.0406 (0.0001)	0.0286 (0.0002)	0.0194 (0.0009)	0.0865 (0.0002)
<b>2007</b>	0.0207 (0.0001)	0.0134 (0.0002)	0.0081 (0.0005)	0.0421 (0.0001)	0.0260 (0.0002)	0.0175 (0.0008)	0.0900 (0.0002)
<b>2008</b>	0.0181 (0.0001)	0.0124 (0.0002)	0.0074 (0.0005)	0.0368 (0.0001)	0.0243 (0.0002)	0.0160 (0.0008)	0.0781 (0.0001)
<b>2009</b>	0.0159 (0.0001)	0.0115 (0.0001)	0.0064 (0.0005)	0.0320 (0.0001)	0.0229 (0.0002)	0.0138 (0.0007)	0.0674 (0.0001)
<b>2010</b>	0.0152 (0.0001)	0.0122 (0.0001)	0.0070 (0.0005)	0.0310 (0.0001)	0.0235 (0.0002)	0.0150 (0.0007)	0.0738 (0.0001)
<b>2011</b>	0.0145 (0.0001)	0.0123 (0.0002)	0.0071 (0.0005)	0.0296 (0.0001)	0.0244 (0.0002)	0.0143 (0.0007)	0.0772 (0.0001)
<b>2012</b>	0.0149 (0.0001)	0.0125 (0.0002)	0.0069 (0.0005)	0.0303 (0.0001)	0.0243 (0.0002)	0.0157 (0.0008)	0.0685 (0.0001)
<b>2013</b>	0.0122 (0.0001)	0.0128 (0.0002)	0.0072 (0.0005)	0.0256 (0.0001)	0.0253 (0.0002)	0.0155 (0.0007)	0.0582 (0.0001)
<b>2014</b>	0.0118 (0.0001)	0.0132 (0.0002)	0.0079 (0.0006)	0.0253 (0.0001)	0.0258 (0.0002)	0.0164 (0.0009)	0.0587 (0.0001)
<b>2015</b>	0.0127 (0.0001)	0.0137 (0.0002)	0.0076 (0.0005)	0.0272 (0.0001)	0.0266 (0.0002)	0.0161 (0.0007)	0.0612 (0.0001)
<b>2016</b>	0.0133 (0.0001)	0.0137 (0.0002)	0.0072 (0.0005)	0.0285 (0.0001)	0.0269 (0.0002)	0.0156 (0.0008)	0.0638 (0.0001)
<b>2017</b>	0.0133 (0.0001)		0.0075 (0.0005)	0.0286 (0.0001)		0.0159 (0.0008)	0.0686 (0.0001)
<b>2018</b>	0.0163 (0.0001)			0.0341 (0.0001)			0.0695 (0.0001)

*Notes:* Selection criteria for analysis provided in Table 1. CCP = FRBNY/Equifax Consumer Credit Panel; ACS = American Community Survey; CPS = Current Population Survey. Because of data limitations, county ACS estimates reflect Public Use Microdata Areas for Migration (MIGPUMAs), not counties. CCP, ACS, and CPS estimates are weighted.

**Table A3. Estimates and Standard Errors of Migration Progression Ratio of First US Internal Migration at State, County, and Tract Levels in FRBNY/Equifax Consumer Credit Panel, National Longitudinal Survey of Youth (1979 and 1997 Cohorts), Panel Study of Income Dynamics, and Survey of Income and Program Participation (2004 and 2008)**

	State	County	Tract
<b>NLSY79</b>	0.1090 (0.0050)	0.2470 (0.0070)	
<b>CCP-Equivalent</b>	0.1276 (0.0003)	0.2680 (0.0003)	
<b>NLSY97</b>	0.3220 (0.0080)	0.6180 (0.0080)	
<b>CCP-Equivalent</b>	0.3120 (0.0005)	0.5944 (0.0006)	
<b>PSID</b>	0.1640 (0.0030)		
<b>CCP-Equivalent</b>	0.1430 (0.0001)		
<b>SIPP04</b>	0.0420 (0.0010)		
<b>CCP-Equivalent</b>	0.0944 (0.0001)		
<b>SIPP08</b>	0.0480 (0.0002)		
<b>CCP-Equivalent</b>	0.0821 (0.0001)		
<b>CCP</b>	0.1489 (0.0001)	0.2940 (0.0002)	0.5230 (0.0002)

*Notes:* Selection criteria for analysis provided in Table 2. CCP = FRBNY/Equifax Consumer Credit Panel; NLSY79 = National Longitudinal Survey of Youth, 1979 Cohort; NLSY97 = National Longitudinal Survey of Youth, 1997 Cohort; PSID = Panel Study of Income Dynamics; SIPP04 = Survey of Income and Program Participation 2004; SIPP08 = Survey of Income and Program Participation 2008. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015; locations are derived from current mailing addresses reported by lenders to Equifax. NLSY79 sample contains all individuals age 39-47 as of January 2004 with non-missing migration information through 2014 interview; location measured as of biennial interview date from January 2004-December 2014. NLSY97 sample contains all individuals age 20-24 as of January 2004 with non-missing migration information through 2016 interview; location measured as of biennial interview date from January 2004-June 2016. PSID observation period spans 2005-2015; location measured biennially. SIPP04 observation period spans March 2004-March 2007; location measured quarterly. SIPP08 observation period spans September 2008-September 2013; location measured quarterly.

**Table A4. Estimates and Standard Errors of Migration Progression Ratio of First US Internal Migration by Age Group at State, County, and Tract Levels in the FRBNY/Equifax Consumer Credit Panel, Panel Study of Income Dynamics, and Survey of Income and Program Participation (2004 and 2008)**

**Panel A. Young Adults (Age 25-29)**

	State	County	Tract
<b>PSID</b>	0.1945 (0.0142)		
<b>CCP-Equivalent</b>	0.2400 (0.0005)		
<b>SIPP04</b>	0.0995 (0.0099)		
<b>CCP-Equivalent</b>	0.1702 (0.0004)		
<b>SIPP08</b>	0.1117 (0.0134)		
<b>CCP-Equivalent</b>	0.1283 (0.0004)		
<b>CCP</b>	0.2468 (0.0005)	0.4833 (0.0006)	0.8006 (0.0005)



**Panel B. Family Age Adults (Age 30-49)**

	<b>State</b>	<b>County</b>	<b>Tract</b>
<b>PSID</b>	0.1241 (0.0068)		
<b>CCP-Equivalent</b>	0.1363 (0.0002)		
<b>SIPP04</b>	0.0440 (0.0027)		
<b>CCP-Equivalent</b>	0.0940 (0.0001)		
<b>SIPP08</b>	0.0645 (0.0045)		
<b>CCP-Equivalent</b>	0.0685 (0.0001)		
<b>CCP</b>	0.1411 (0.0002)	0.2885 (0.0002)	0.5445 (0.0003)

**Panel C. Older Adults (Age 50-74)**

	<b>State</b>	<b>County</b>	<b>Tract</b>
<b>PSID</b>	0.0905 (0.007)		
<b>CCP-Equivalent</b>	0.1010 (0.0002)		
<b>SIPP04</b>	0.0255 (0.0020)		
<b>CCP-Equivalent</b>	0.0702 (0.0001)		
<b>SIPP08</b>	0.0287 (0.0024)		
<b>CCP-Equivalent</b>	0.0514 (0.0001)		
<b>CCP</b>	0.1053 (0.0002)	0.2018 (0.0002)	0.3715 (0.0003)

*Notes:* Selection criteria for analysis provided in Table 2. CCP = FRBNY/Equifax Consumer Credit Panel; PSID = Panel Study of Income Dynamics; SIPP04 = Survey of Income and Program Participation 2004; SIPP08 = Survey of Income and Program Participation 2008. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015. Locations are derived from current mailing addresses reported by lenders to Equifax. PSID observation period spans 2005-2015; location measured biennially. SIPP04 observation period spans March 2004-March 2007; location measured quarterly. SIPP08 observation period spans September 2008-September 2013; location measured quarterly.

**Table A5. Estimates and Standard Errors of Migration Progression Ratios of Second and Third US Internal Migration at State, County, and Tract Levels in FRBNY/Equifax Consumer Credit Panel, National Longitudinal Survey of Youth (1979 and 1997 Cohorts), Panel Study of Income Dynamics, and Survey of Income and Program Participation (2004 and 2008)**

**Panel A. Second Migration**

	State	County	Tract
<b>NLSY79</b>	0.3210 (0.0220)	0.4070 (0.0150)	
<b>CCP-Equivalent</b>	0.2748 (0.0009)	0.3189 (0.0007)	
<b>NLSY97</b>	0.5600 (0.0160)	0.6900 (0.0100)	
<b>CCP-Equivalent</b>	0.5136 (0.0011)	0.6017 (0.0008)	
<b>PSID</b>	0.3800 (0.0100)		
<b>CCP-Equivalent</b>	0.3207 (0.0004)		
<b>SIPP04</b>	0.1990 (0.0140)		
<b>CCP-Equivalent</b>	0.2033 (0.0004)		
<b>SIPP08</b>	0.2400 (0.0190)		
<b>CCP-Equivalent</b>	0.2467 (0.0005)		
<b>CCP</b>	0.3839 (0.0004)	0.4427 (0.0003)	0.5683 (0.0002)

**Panel B. Third Migration**

	<b>State</b>	<b>County</b>	<b>Tract</b>
<b>NLSY79</b>	0.2150 (0.0033)	0.2960 (0.0220)	
<b>CCP-Equivalent</b>	0.2205 (0.0017)	0.2696 (0.0011)	
<b>NLSY97</b>	0.4040 (0.0210)	0.5820 (0.0130)	
<b>CCP-Equivalent</b>	0.3918 (0.0015)	0.5027 (0.0010)	
<b>PSID</b>	0.2220 (0.0140)		
<b>CCP-Equivalent</b>	0.2468 (0.0007)		
<b>SIPP04</b>	0.2610 (0.0360)		
<b>CCP-Equivalent</b>	0.2214 (0.0010)		
<b>SIPP08</b>	0.1730 (0.0340)		
<b>CCP-Equivalent</b>	0.2694 (0.0010)		
<b>CCP</b>	0.3427 (0.0007)	0.4100 (0.0005)	0.5310 (0.0003)

*Notes:* Selection criteria for analysis provided in Table 2. CCP = FRBNY/Equifax Consumer Credit Panel; NLSY79 = National Longitudinal Survey of Youth, 1979 Cohort; NLSY97 = National Longitudinal Survey of Youth, 1997 Cohort; PSID = Panel Study of Income Dynamics; SIPP04 = Survey of Income and Program Participation 2004; SIPP08 = Survey of Income and Program Participation 2008. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015. Locations are derived from current mailing addresses reported by lenders to Equifax. NLSY79 sample contains all individuals age 39-47 as of January 2004 with non-missing migration information through 2014 interview; location measured as of biennial interview date from January 2004-December 2014. NLSY97 sample contains all individuals age 20-24 as of January 2004 with non-missing migration information through 2016 interview; location measured as of biennial interview date from January 2004-June 2016. PSID observation period spans 2005-2015; location measured biennially. SIPP04 observation period spans March 2004-March 2007; location measured quarterly. SIPP08 observation period spans September 2008-September 2013; location measured quarterly.

**Table A6. Estimates and Standard Errors of Return Migration Ratio of US Internal Migration at State, County, and Tract Levels in FRBNY/Equifax Consumer Credit Panel, National Longitudinal Survey of Youth (1979 and 1997 Cohorts), and Panel Study of Income Dynamics**

	State	County	Tract
<b>NLSY79</b>	0.1590 (0.0170)	0.1510 (0.0110)	
<b>CCP-Equivalent</b>	0.1331 (0.0007)	0.1110 (0.0005)	
<b>NLSY97</b>	0.2670 (0.0140)	0.2140 (0.0009)	
<b>CCP-Equivalent</b>	0.2292 (0.0009)	0.1699 (0.0006)	
<b>PSID</b>	0.2040 (0.0008)		
<b>CCP-Equivalent</b>	0.1539 (0.0003)		
<b>CCP</b>	0.1877 (0.0003)	0.1536 (0.0002)	0.0883 (0.0001)

*Notes:* Selection criteria for analysis provided in Table 2. CCP = FRBNY/Equifax Consumer Credit Panel; NLSY79 = National Longitudinal Survey of Youth, 1979 Cohort; NLSY97 = National Longitudinal Survey of Youth, 1997 Cohort; PSID = Panel Study of Income Dynamics. CCP sample contains all individuals with complete panels from Q1 2005 to Q1 2015. Locations are derived from current mailing addresses reported by lenders to Equifax. NLSY79 sample contains all individuals age 39-47 as of January 2004 with non-missing migration information through 2014 interview; location measured as of biennial interview date from January 2004-December 2014. NLSY97 sample contains all individuals age 20-24 as of January 2004 with non-missing migration information through 2016 interview; location measured as of biennial interview date from January 2004-June 2016. PSID observation period spans 2005-2015; location measured biennially. SIPP04 observation period spans March 2004-March 2007; location measured quarterly. SIPP08 observation period spans September 2008-September 2013; location measured quarterly.