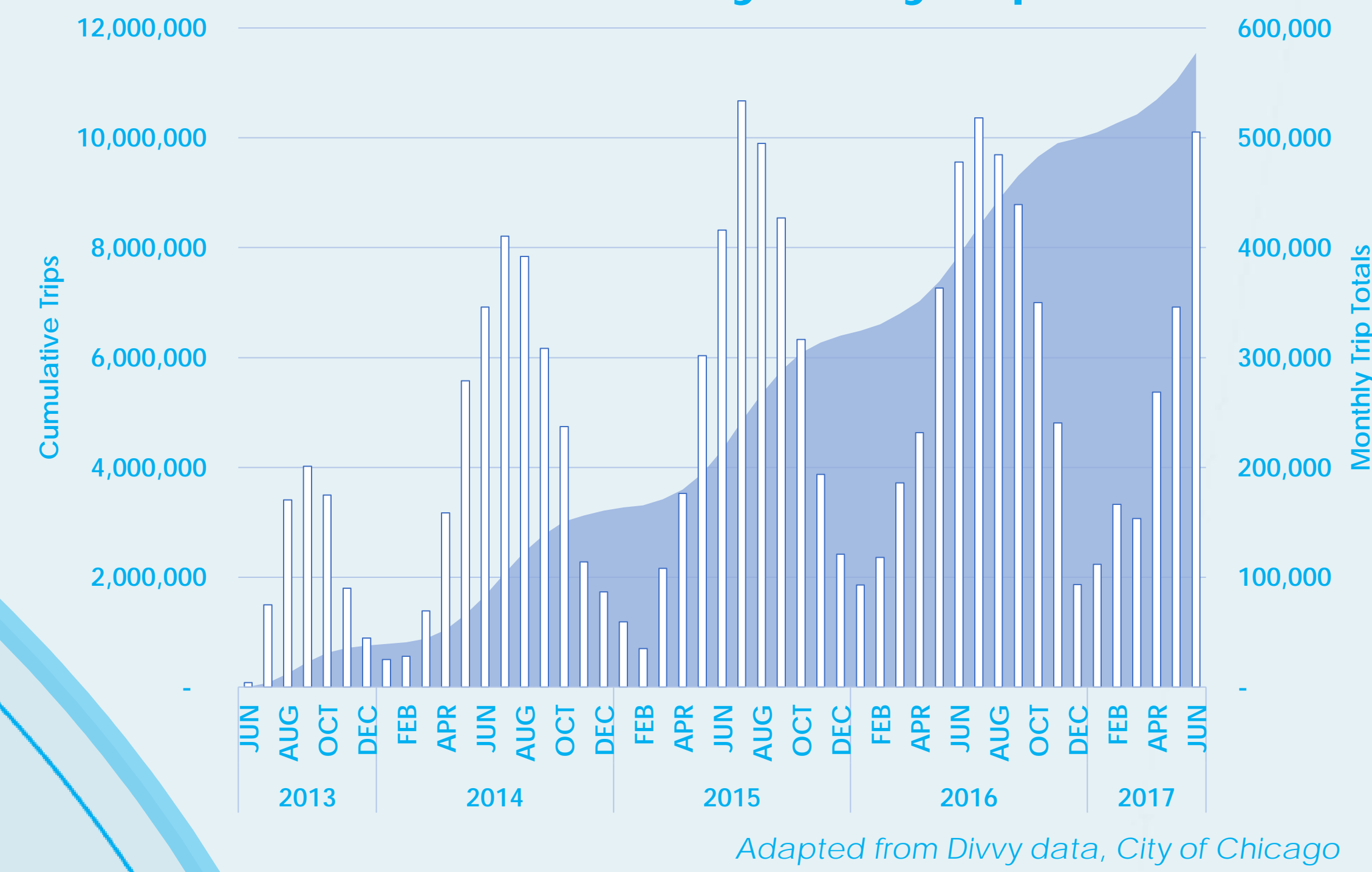


Dimensions of Divvy

To analyze Divvy's growth and expansion, we use both trip and station data that were made available via the Divvy website. By merging the trips and stations datasets, we were able to create a comprehensive data table containing characteristics for each Divvy trip taken over a four-year period, June 2013 through December 2017 (i.e., 13,822,197 trips across 585 stations).

Cumulative and Monthly Divvy Trips 2013-17



The Divvy bikeshare system, located in the City of Chicago and two adjacent suburbs, officially launched in June 2013 and with over 13.8 million logged rides and nearly 6 million trip hours through December 2017-it is one of the largest and most successful bikeshare systems in the country.

This research carried out by DePaul University's Chaddick Institute briefly traces the evolution of Chicago's Divvy system beginning with its initial rollout in 2013 through its first and second expansions, in 2015 and 2016, respectively, paying special attention to service and performance gaps. We also develop a series of statistical models to identify factors that best explain variations in Divvy system usage at the station level.

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statistical model

We used a multivariate adaptive regression splining (MARS) technique to model the significance and explanatory power of 100 independent variables in explaining variation of station usage aggregated at two spatial scales (1/4 mile and 1/2 miles). The statistical model made use of a subset of trips taken over a study period when 582 stations were operational.

MARS Regression Results

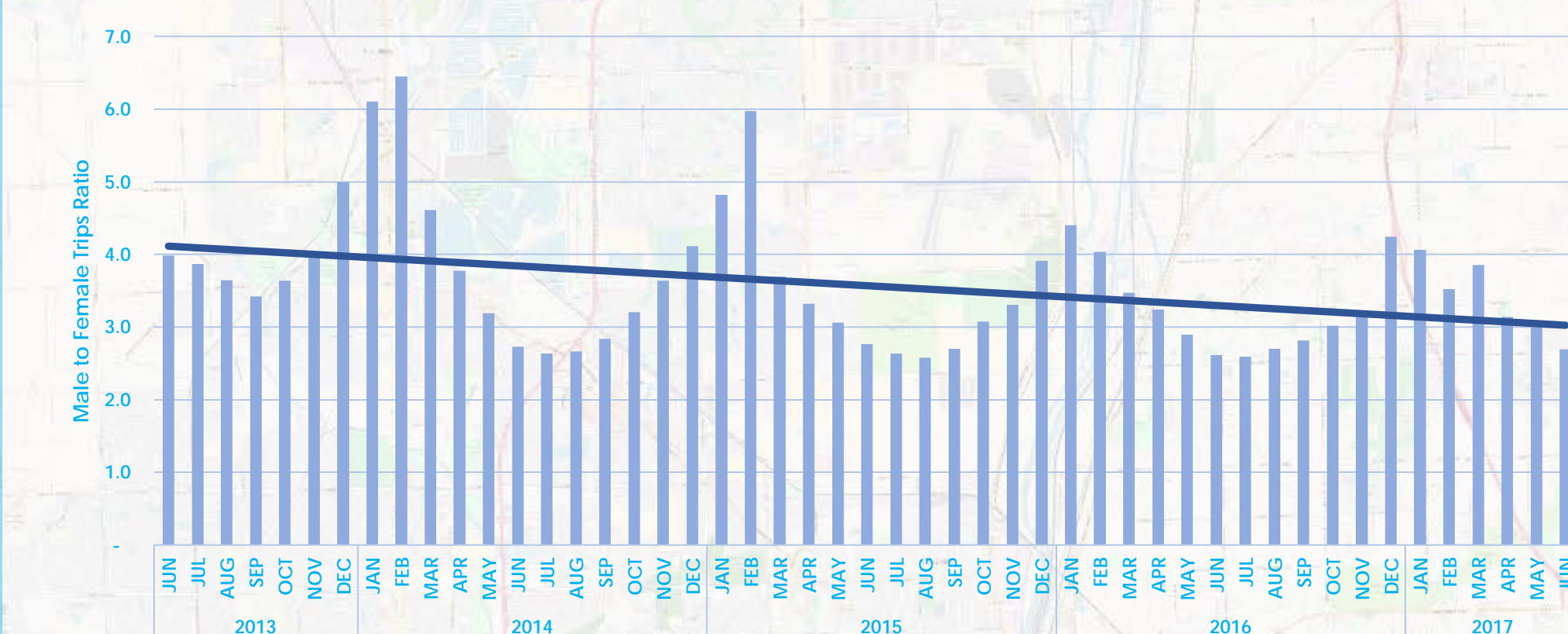
Variable	Standardized	Coefficient	Std. Error
(Intercept)	0.00	5.55	0.72
Percent multi-family (5 or more) units	0.26	0.02	1.79E-03
Accessibility to jobs via public transit	0.18	1.84E-04	3.11E-07
Diurnal Divvy ridership diversity index	0.08	0.03	0.01
Bike facilities density (network miles per mi ²)	0.03	0.03	0.01
Average distance to Divvy stations	-0.09	-0.10	0.03
Percent of commuters who drove alone	-0.09	-0.01	3.45E-03
Percent unemployed	-0.15	-0.07	0.01
Percent of population non-White, not Latino	-0.18	-0.01	1.92E-03
Residential foreclosures per 100 parcels	-0.22	-0.70	0.09

Dependent variable = $\ln(\text{Rentals from Divvy station})$
 R-squared: 0.87; Adj R-squared: 0.86; F-statistic: 337.907 on 11 and 570 DF, p-value: 0.000

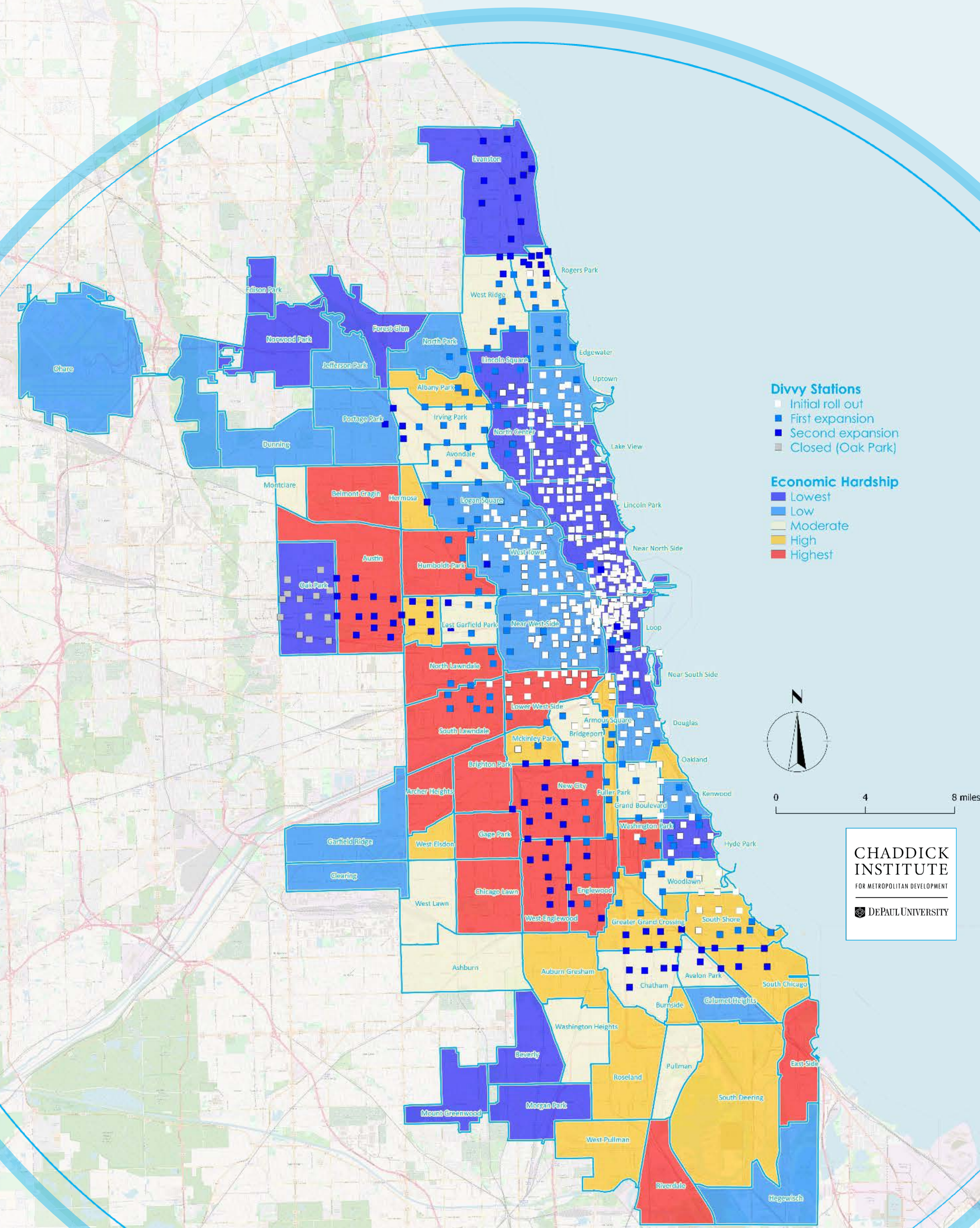
performance gaps

In addition to performance disparities across economic hardship categories, this study found considerable usage gaps by gender across Chicago community areas. The ratio of Divvy trips taken by male riders exceeds the number of trips taken by female riders although the gap has closed over time.

Monthly Male to Female Trips Ratios, 2013-17



Adapted from Divvy data, City of Chicago



network connectivity

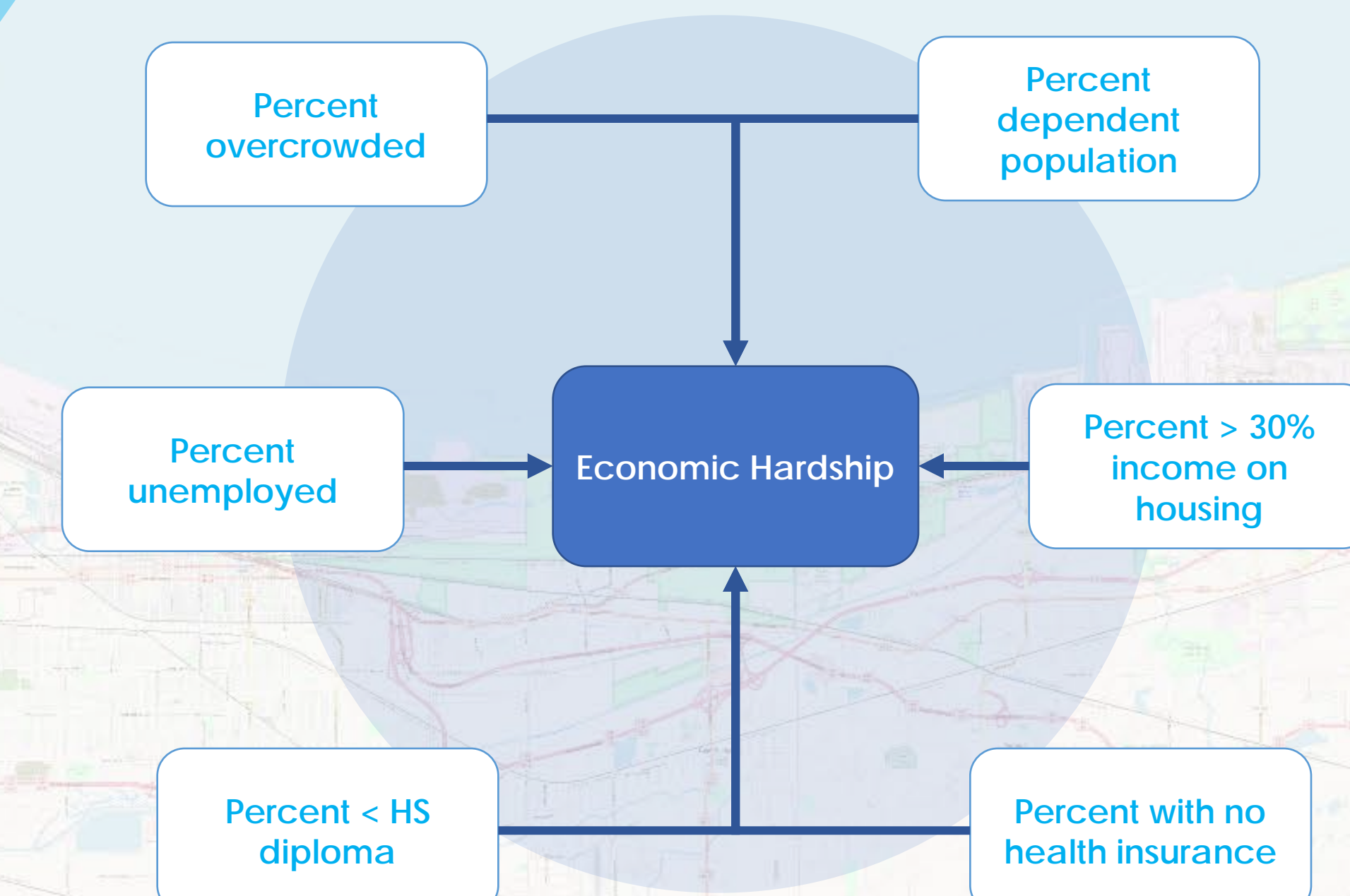
Similar to other bikeshare systems across the country, Divvy is designed to improve multimodal connectivity by making it easier for people to replace short automobile and transit trips with bike trips. Improving connectivity has the potential to simultaneously reduce private vehicle miles traveled and relieve pressure on the region's congested roads and transit lines.

Characteristics by Station Cohort

	Initial rollout	First expansion	Second expansion	Total ^(a)
Divvy stations	300	175	110	585
Service area (mi ²) ^(b)	31.5	30.6	19.2	74.4
Station density (mi ²)	9.52	5.72	5.57	7.82
Communities ^(c)	21	35	24	47
Population density (mi ²)	20,761	18,495	13,298	17,671
Station distance (mi) ^(d)	0.24	0.41	0.46	0.33
Train stations ^(e)	84	68	39	191
Bus stops ^(e)	2,549	2,260	1,377	6,186

Notes: (a) Combined area of non-overlapping 1/4 mile buffers from Divvy stations; (b) Number of communities that either intersect or are completely within service area; (c) Average minimum distance to closest Divvy station by service area; (d) Chicago Transit Authority (CTA) L train and Metra commuter train stops; (e) CTA and PACE suburban bus stops

service gaps



Despite gains in multimodal mobility overall, there are disparities in Divvy service provision across communities of different types. We developed an economic hardship index to examine both the distribution and utilization or performance of stations across neighborhoods. Presently, 21 percent of Divvy stations (125) are located in communities with relatively high economic hardship, which is far greater than the 24 installed during the initial rollout.