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ABSTRACT

Differences in Employment Outcomes for College Town Stayers and Leavers

Areas surrounding colleges and universities are often able to build their local stock of human capital by retaining recent graduates in the area after they finish their education. This paper classifies 41 U.S. metropolitan areas as "college towns" and investigates differences in employment outcomes between college graduates who stay in the college town where they obtained their degree and college graduates who leave after completing their degree. We find that college town stayers experience less favorable employment outcomes along multiple dimensions. On average, stayers earn lower annual and hourly wages and work in less educated occupations.

JEL Classification: I20, J24, R23

Keywords: migration, human capital, education, college towns, wages

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1. Introduction

Researchers have consistently shown that human capital is an important ingredient for regional economic prosperity. Individuals who invest in their own human capital benefit themselves through higher productivity and wages (Psacharopoulos and Patrinos 2004; Abel and Gabe forthcoming). However, there is growing evidence that skilled workers also benefit other workers in the local labor market by making them more productive as well (Rauch 1993; Moretti 2004). In particular, researchers have suggested that college graduates play a key role.[1] Areas with a high percentage of adults with college degrees have higher wages and higher employment rates for both college graduates and non-graduates (Moretti 2004; Winters 2010). Shapiro (2006) also suggests that college graduates increase the quality of life in an area and make it a more desirable place to live. Because of these external benefits of human capital, highly educated areas also experience faster employment and population growth (Glaeser, Scheinkman and Shleifer 1995; Simon 1998; Simon and Nardinelli 2002).

Because of the many benefits of human capital, policymakers are often very interested in finding ways to attract and retain highly educated workers (Hoare and Corver 2010). Local colleges and universities often play an important role in building an area's stock of college educated workers for at least two reasons. First, they help educate local residents and keep them close to home for college (Hickman 2009). Second, colleges and universities also bring in students from outside the local area. While many of these recent student in-migrants will leave once they complete their education, some of them will stay and help build the area's local stock of human capital (Blackwell, Cobb,

[1] Florida, Mellander and Stolarick (2008) suggest instead that the more relevant ingredient for regional prosperity is the presence of a "creative class" of artists and workers employed in creative occupations.

and Weinberg 2002; Huffman and Quigley 2002; Groen 2004; Groen and White 2004; Oosterbeek and Webbink forthcoming).

While research has shown that some recent graduates stay in the area where they obtained their education, there has been very little research examining how staying in the area affects individual employment outcomes for recent graduates. Several researchers examine the effects of migration on income and employment for certain groups (e.g., Axelsson and Westerlund 1998; Yankow 2003; Boheim and Taylor 2007; Anil, Sjoquist, and Wallace 2010; Blackburn 2010a,b), but none of these explicitly examine the effects of staying in a college town for recent graduates. Many recent college graduates might be better able to find gainful employment by relocating to a different labor market and of course many graduates do leave the area where they completed their education. Recent graduates who stay in the area where they earned their degree may pay a price for doing so, and this price is likely to be especially large in smaller labor markets that produce large numbers of college graduates, i.e., "college towns."

This paper seeks to fill an important gap in the research literature by investigating differences in employment outcomes between recent college graduates who stay in the college town where they obtained their degree and those who leave after completing their degree. Using decennial census data, we classify 41 U.S. metropolitan areas as college towns and examine differences in the probability of employment, annual wage income, hourly wages, annual hours worked, and a measure of the education level of a worker's occupation. The results suggest that, on average, college town stayers earn lower annual and hourly wages and work in less educated occupations. Thus, it appears that college town stayers generally experience worse employment outcomes than those who leave. These results continue to hold when we employ a difference in

differences approach that treats recent graduates from large metropolitan areas as a control group and when we control for differences in the cost of living across labor markets.

2. Conceptual Framework

The conceptual framework for this paper proceeds by considering the migration decision of a recent college graduate. We follow a large literature and view migration as a human capital investment (Sjaastad 1962). In this framework individuals maximize their own expected utility and choose to live in the area that offers the highest expected utility. Thus, upon completing her degree, a college graduate will move to a new area if it gives her greater expected utility than the place where she earned her degree. The expected utility that an area offers will depend on a number of factors including wages and employment opportunities, the local cost of living, consumer amenities and quality of life, and the tastes and preferences of the individual making the migration decision (Clark and Hunter 1992; Franklin 2003; Arntz 2010). Chen and Rosenthal (2008) and Plane and Jurjevich (2009) suggest that young college graduates are often most strongly attracted to large metropolitan areas with high wages and a strong labor market. Whisler et al. (2008) argue that cultural and recreational amenities also play an important role in retaining college graduates in an area. Furthermore, Berry and Glaeser (2005) and Waldorf (2009) suggest that educated individuals are attracted to areas that already have large numbers of educated people.

While some areas are certainly better than others at attracting and retaining recent college graduates, the optimal location will not be the same for all individuals (Plane and

Heins 2003). Individuals have different skill sets and different preferences for various locations. Furthermore, some graduates may develop human capital that is specific to the location where they earned their college degree (DaVanzo 1983; Krupka 2009; Winters forthcoming). For example, they may develop networks with professors and local employers that enhance their employment prospects in the area. Alternatively, recent graduates may have built strong friendships and developed a taste for local amenities that help tie them to the area where they attended college. These preferences for the place where they attended college may even incline some recent graduates to accept lower paying jobs to stay in the area that they have grown to love.

3. Empirical Approach and Data

This paper examines employment differences between recent college graduates who stay in the college town where they earned their degree and those who leave a college town after their education is complete. We focus on recent college graduates who earned their degrees in relatively small college towns because it is these graduates who are likely to have the greatest difficulty finding a good job in the area where they completed their degree. Large metropolitan areas like New York and Los Angeles have thicker labor markets and generally offer better employment prospects for recent graduates and are better able to retain recent college graduates (Whisler et al. 2008). This paper uses microdata from the 2000 Census available from the IPUMS (Ruggles et al. 2008) to classify 41 U.S. metropolitan areas as college towns. We define a metropolitan area as a college town based on the percentage of adults in the area who are enrolled in college. More specifically, an area is considered a college town if the share of the population age 18 and older enrolled in college is more than one standard deviation greater than

the mean across all metropolitan areas. For the year 2000, the mean share of adults enrolled in college across metropolitan areas was 0.092, and the standard deviation across metropolitan areas was 0.050. Thus an area is considered a college town if its share enrolled in college exceeds 0.142. The 41 metropolitan areas meeting this criterion and included in this study are listed in Table 1.

Admittedly, this definition of college towns is a fairly restrictive one, and a case could be made that many areas not included should be rightfully considered as college towns. The present definition is intended to limit the analysis to areas where colleges and universities have a relatively large influence. Furthermore, the 41 areas meeting this criterion are also relatively small metropolitan areas having a mean population of 203,919. Again, it is these smaller areas in which recent graduates may suffer the most from staying in the area where they went to college. Ideally, we might also like to include non-metropolitan college towns, but unfortunately the Census public use microdata do not allow separate identification of geographic areas with populations less than 100,000. Consequently, the lowest level of identifiable geography, the PUMA, lumps very small areas together with other nearby areas that often span large land masses. This makes it harder to identify whether recent college graduates remain in non-metropolitan college towns because they might still be in the same PUMA but have moved to a new location a considerable distance from where they attended college. These geographic identification problems also affect a few of the metropolitan areas included in this study, though to a lesser extent than would be true for non-metropolitan areas.

After defining the 41 college town metropolitan areas examined in this study, we next wish to consider differences in employment outcomes between recent graduates who stay in these college towns and those who leave after completing their degree. We define recent college graduates as persons between the ages of 23 and 27 with at least a four-year college degree. We do not observe when an individual completed her degree, so our definition of recent is based on age. College graduates ages 23-27 at the time of the census were ages 18-22 five years before the census and were likely to have been enrolled in college but not yet have earned a bachelor's degree. The main results presented below are qualitatively robust to altering the age range to include persons ages 28 and 29 at the time of the census or exclude persons age 23 at the time of the census. Our initial analysis also restricts the sample to recent college graduates who resided in one of the 41 college towns five years prior to the census. Unfortunately, there may be some misreporting of previous residence for recent college graduates. Some recent graduates living in a college town five years prior may instead report their residence five years ago as their parents' residence. It is unclear how much or in which direction the resulting sampling and measurement error would affect the results.

The sample also excludes two groups of recent graduates. First, we exclude persons who are still enrolled in higher education in 2000. Since these people are still in school it does not make sense to compare their employment outcomes to those who have completed their schooling. We also exclude all persons born outside the U.S. since many of these only come to the U.S. for an education and leave after completing their degree. As a practical matter, the results below are qualitatively robust to including recent college graduates who are currently enrolled and foreign born graduates who are still in the U.S. in 2000, but the results presented do

not include these groups of recent graduates. After restricting the sample along these dimensions we are left with 11,237 individuals.

We next define the binary variable, $Stayer$, which is equal to one if the recent graduate is still in the college town where she resided five years prior and zero otherwise. We then use linear regression to estimate differences between stayers and leavers for several employment outcomes controlling for differences in individual characteristics, X, i.e, we estimate regressions of the following form:

(1) $\mathrm{Y} = \theta \times Stayer + X\beta + \varepsilon.$

The individual characteristics include separate dummy variables for the highest degree earned, age, whether the individual is female, Black, Hispanic, Asian, Other Nonwhite, married, or has children. One unfortunate limitation of the current paper is that there may be unobservable differences between stayers and leavers that also separately affect employment outcomes.[2] For example, leavers may be more ambitious and career driven than stayers. If drive and ambition also improve employment prospects, then failing to observe these will induce a negative correlation between employment outcomes and staying. Several previous studies have attempted to account for whether migrants are generally a self-selected group (e.g., Axelsson and Westerlund 1998; Yankow 2003; Boheim and Taylor 2007; Blackburn 2010). This usually involves trying to identify a variable that affects the probability of migration but does not separately affect employment outcomes such as proximity to family or housing tenure in the previous period. The census data used in this study do not offer information on either of these and we are thus unable to examine whether migration is endogenous for recent college graduates

[2] An additional caveat is that advanced education, marital status and having children may be simultaneously determined with employment outcomes. However, removing these variables from the analysis does not change the qualitative results presented below.

who earned their degree in a college town.[3] Instead, we examine the sensitivity of the results to employing a difference in differences (DD) technique that treats recent graduates from large metropolitan areas as a control group. More details are discussed later.[4]

This paper considers five employment outcomes: 1) whether an individual is employed at the time of the census, 2) the log of annual wage income earned in the previous year, 3) the log average hourly wage in the previous year computed as annual wages divided by the number of hours worked in the previous year, 4) the log of hours worked in the previous year, and 5) the percentage of workers in the same occupation with a bachelor's degree or higher for employed recent graduates. This fifth outcome is intended to capture whether stayers are more likely to take jobs for which they are overeducated. The hypothesis of this paper is that college town stayers may experience worse employment outcomes than those who leave along a number of dimensions. Summary statistics for the dependent and independent variables for the full sample are reported in Table 2. A few things are worth mentioning. First, 92.3 percent of the sample is employed, reflecting the high rates of labor force participation and low rates of unemployment for young college graduates as well as the relatively strong labor market in 2000. Second, only 19.4 percent of recent graduates who lived in a college town five years prior are still in the college town where they completed their degree. The large majority, therefore, have either moved back to a previous location or moved on to a new location.

Table 3 presents the mean values of the dependent and independent variables separately for college town stayers and leavers and also reports the differences in the means and whether

[3] Even if this information were available, it would be unlikely to fully alleviate endogeneity concerns since few young college students are homeowners and proximity to family while in college may itself be correlated with unobserved characteristics that affect employment prospects.

[4] An additional issue suggested by previous literature is that employment differences between movers and stayers may be affected by the amount of time since the move. Unfortunately, we do not know exactly when people move and are unable to offer evidence on how the effects evolve over time.

the differences are statistically significantly different from zero. This provides a first look at a number of differences between those who stay in a college town after completing a degree and those who leave. According to these raw differences, stayers perform significantly worse than leavers in all five of the employment outcomes that we study. Stayers have lower employment rates, earn lower annual and hourly wages, work fewer annual hours, and work in less educated occupations. However, the table also shows that there are important differences between stayers and leavers in individual characteristics. Stayers are significantly less likely to hold a master's or professional degree, and there are some differences in age between the two groups. Females are significantly more likely than males to stay in the college town where they completed their degree. Blacks are significantly more likely to stay than Whites, but Asians are significantly less likely to stay than Whites. Stayers are also significantly more likely to be married and more likely to have children. Being married and having children, therefore, appear to increase the costs of leaving and tie recent graduates to the area where they completed their degree. Because of these significant differences in individual characteristics, we cannot accurately assess the effect of staying on employment outcomes simply by taking differences in means. Instead, we need to use multivariate regression techniques to control for the individual characteristics. The next section presents the results of regressing the five employment outcomes on the variable $Stayer$ and the individual characteristics.

4. Empirical Results

4.1 Differences between College Town Stayers and Leavers

Regression results for differences between college town stayers and leavers are presented in Table 4. The first column reports results for the probability of employment estimated via a linear probability model. The results are qualitatively robust to estimating probit and logit models. The estimated coefficient for $Stayer$ is small and not statistically different from zero. In other words, the results suggest that there is no difference in the probability of employment for stayers and leavers. Recent college graduates from college towns have an equal probability of finding employment regardless of whether they stay in the area where they earned their degree or move to a different area. Note that this is in contrast to what was observed in Table 3, confirming the importance of employing multivariate regression techniques to control for individual characteristics. Only a few of the additional variables have statistically significant effects on the probability of employment for recent college graduates who lived in a college town five years prior. Persons who have earned a master's degree are significantly more likely to be employed than those who only have a bachelor's degree with an estimated coefficient of 0.019. Professional degrees and doctoral degrees, however, do not have a statistically significant effect on employment. Similarly, age does not have a significant effect on the probability of employment for recent graduates. Females are significantly less likely to be employed than males with a coefficient of -0.034, but there are no significant differences based on race/ethnicity. Marriage has no significant effect on employment, but having children significantly reduces the probability of employment with a relatively large coefficient of -0.172.

The second column of Table 4 reports results for the log of annual income from wages and salaries. First note that this regression and the following regressions have fewer observations than in the first column because some individuals did not work in the previous calendar year. Taking logs forces us to drop those with zero wages and hours because the log of

zero is not defined. Turning to the results, Stayer has a statistically significant negative effect with a coefficient of -0.267. This confirms that recent graduates who stay in the college town where they completed their degree on average accept much lower paying jobs than those who leave. Converting logs to percentages, the coefficient estimate suggests that college town stayers earn roughly 30 percent lower wages than those who leave. This is quite a price to pay for staying and helps explain why so many recent graduates leave college towns after completing their degrees. Several additional variables also have important effects on log annual wages. Interestingly, holders of professional degrees actually earn significantly lower annual wages than those with only a bachelor's degree with a coefficient of -0.132. However, only 3.2 percent of the sample has a professional degree and they are likely to have earned that degree very recently and have very little work experience in their new job. Similarly, master's degrees and doctoral degrees do not significantly affect annual wages for this group. Age has a very strong effect on annual wages with older workers earning significantly more. Females earn significantly lower annual wages than males with a coefficient of -0.208, and Blacks earn significantly lower annual wages than Whites with a coefficient of -0.082. However, Asians, Hispanics and Other Nonwhites do not earn significantly different annual wages than Whites. Married persons earn significantly higher annual wages with a coefficient of 0.080, and persons with children earn significantly lower annual wages with a coefficient of -0.263.

Log annual wages can essentially be broken down into log hourly wages and log annual hours worked. The third and fourth columns of Table 4 report the results for these separate outcomes. According to the results, college town stayers both earn significantly

lower hourly wages and work significantly fewer annual hours with coefficients of -0.209 and -0.058, respectively. Notice that these two coefficients add up to the coefficient in the second column by definition. While both are significantly negative, the magnitude is much greater for log hourly wages and suggests that lower hourly wages account for 78 percent of the lower annual wages of stayers. The results for advanced education are again somewhat interesting. Master's degree holders have significantly higher hourly wages but significantly lower annual hours with coefficients of 0.084 and -0.106. Professional degree holders earn similar hourly wages but work significantly fewer hours than persons with only a bachelor's degree with a coefficient of -0.176. For professional degrees the lower annual hours explains all of the lower annual wages in the second column. Given the age range considered, these results likely suggest that many master's and professional degree holders were in school for part of the previous year and devoted less time to work because of school. Doctoral degree holders earned significantly higher hourly wages with a coefficient of 0.199, but the difference in hours worked is not statistically significant, probably due in part to the small number of doctorates in the sample. Age generally has a significantly positive effect on hourly wages and annual hours, except there is no difference in hourly wages between 23 and 24 year olds. Females earn lower hourly wages and work fewer annual hours with coefficients of -0.115 and -0.092, respectively. Blacks earn similar hourly wages to Whites, but work significantly fewer hours with a coefficient of -0.082. Asians earn higher hourly wages with a coefficient of 0.158 but do not work significantly different hours than Whites. Hispanics and Other Nonwhites earn similar wages to Whites but work significantly fewer hours with coefficients of -0.064 and -0.087, respectively. Married persons earn significantly higher hourly wages and work significantly more hours with

coefficients of 0.053 and 0.027. Those with children earn significantly lower hourly wages and work significantly fewer hours with coefficients of -0.031 and -0.232.

The fifth column of Table 4 reports the results of regressing the share of workers in a worker's 3-digit occupation with a bachelor's degree or higher on the individual characteristics. The sample for this regression only includes recent graduates who are currently employed, which results in fewer observations than in the previous columns. The dependent variable is computed based on all workers in the U.S. between the ages of 23 and 39 regardless of where they work or where they resided five years prior. This variable is meant to measure the extent to which an occupation requires a four-year college degree. Some recent college graduates are likely to end up taking jobs where a college degree is not essential for the job. This may be especially true for recent graduates who stay in a small college town after finishing their degree. The results in the fifth column suggest that this is indeed the case. The variable $Stayer$ has a negative and significant effect with a coefficient of -0.052. College town stayers, therefore, on average work in less educated occupations than college town leavers. Not surprisingly, the results also suggest that workers with advanced degrees end up working in more educated occupations with statistically significant coefficients of 0.157, 0.364, and 0.258 for workers with a master's, professional, and doctoral degree. Age has a statistically insignificant effect on the occupational education measure. Females work in significantly more educated occupations than males with a coefficient of 0.015. Blacks, Asians, and Hispanics work in occupations with similar education levels as Whites, but Other Nonwhites work in significantly less educated occupation with a coefficient of -0.065. Married individuals work in significantly more educated occupations with a coefficient of

0.030, but persons with children do not work in occupations with significantly different education levels than persons without children.

4.2 Difference in Differences Approach with Recent Graduates from Large Metro Areas

The results thus far suggest that recent college graduates who stay in the college town where they completed their degree experience significantly worse employment outcomes than those who leave college towns. Furthermore, the magnitudes of these effects are often quite large. The difference in annual wages between stayers and leavers is roughly 30 percent, a very large effect. A major concern, however, is that stayers and leavers are self-selected groups and might differ along unobserved dimensions. For example, leavers might have more drive and ambition that also makes them more productive workers. Unfortunately, the census microdata do not provide much information that would be useful in examining the endogeneity of migration. However, we can offer some additional insight about the effects on recent graduates of staying in a college town by employing a difference in differences (DD) regression technique that treats recent graduates from large metropolitan areas as a control group.

The DD approach for each employment outcome variable, Y, involves estimating the following regression for recent graduates who either resided in a college town or a large metropolitan area five years prior to the Census:

(2) $$Y = \gamma \times Stayer + \delta \times CollegeTown + \theta \times Stayer \times CollegeTown + X\beta + \varepsilon,$$

where $Stayer$ is an indicator variable equal to one if a recent graduate still resides in the same area as they did five years prior and zero otherwise, and $CollegeTown$ is an indicator variable equal to one if a recent graduate resided in a college town five years prior and equal to zero if the recent graduate was in a large metro area five years prior. For the results presented, we define large metropolitan areas as those with a year 2000 population of at least 5,000,000, but the

results are qualitatively robust to defining large metros as all those with at least 1,000,000 people. The DD regressions also include a variable for the interaction of $Stayer$ and $CollegeTown$, which measures the difference in stayer-leaver differences between college towns and large metro areas. This interaction term is now the primary variable of interest. The DD procedure is an attempt to account for selection on unobservables by assuming that recent graduates select into migration in similar ways in college towns and large metro areas. If this assumption is violated, the DD procedure may also lead to invalid estimates.

Before proceeding to the DD results, it is first informative to simply compare raw differences in means between recent graduate stayers and leavers from large metropolitan areas. These comparisons are reported in Table 5. As seen, the raw differences between stayers and leavers from large metros are small and insignificant for employment probabilities, annual wages, and occupational education levels. Large metro stayers do earn significantly higher hourly wages but work significantly fewer annual hours. Importantly, there are also some significant differences in individual characteristics. Also, though not explicitly shown, there is a considerable difference between college towns and large metro areas in the percentage of recent graduates who stay in the area after completing their degree. While only 19.4 percent of recent graduates from college towns are classified as stayers, 73.8 percent of recent graduates from large metros are considered stayers.

The DD regression results for the five employment outcomes are reported in Table 6. For the employment regression in the first column, $Stayer$ has a small and insignificant coefficient, while $CollegeTown$ has a significantly positive coefficient of 0.013. The interaction of $Stayer$ and $CollegeTown$ has a small and insignificant coefficient, reaffirming the results in Table 4 that staying in a college town after graduating does not affect the probability of employment.

The results for log annual wages are presented in the second column of Table 6; $Stayer$ has a statistically significant coefficient of 0.024, suggesting that recent graduates who stay in the large metropolitan area where they completed their degree actually earn slightly higher annual wages than recent graduates from large metros who leave. $CollegeTown$ has a significant coefficient of -0.024, suggesting that college town leavers on average earn slightly lower annual wages than big city leavers. Again, the interaction of $Stayer$ and $CollegeTown$ is the main explanatory variable of interest and has a significant negative effect on log wages with a coefficient of -0.292. This reaffirms that staying in a college town results in significantly lower annual wages for recent graduates even when we treat recent graduates from large metro areas as a control group.

The third and fourth columns of Table 6 report the results for log hourly wages and log annual hours, respectively. $Stayer$ has a significantly positive effect on log hourly wages but a significantly negative effect on log annual hours with coefficients of 0.063 and -0.039, respectively. Thus, large metro stayers earn higher hourly wages but work fewer hours than large metro leavers. $CollegeTown$ has a significantly negative coefficient for log hourly wages of -0.020 but an insignificant effect on log annual hours. The interaction term has a significantly negative effect on hourly wages with a coefficient of -0.270 but an insignificant effect on log annual hours. These results suggest that nearly all of the adverse effect of staying in a college town on annual wages results from lower hourly wages.

The fifth column of Table 6 presents results for the percent of workers in an occupation with a bachelor's degree or higher. $Stayer$ has a significantly positive effect with a coefficient of 0.014 suggesting that large metro stayers work in slightly more educated occupations than large metro leavers. $CollegeTown$ also has a significantly positive coefficient of 0.015,

suggesting that college town leavers also work in slightly more educated occupations than large metro stayers. The interaction term is negative and significant with a coefficient of -0.068, reaffirming that staying in a college town increases the likelihood of recent graduates taking jobs in occupations that do not require a four-year college degree.

4.3 Difference in Differences Approach Controlling for the Cost of Living

The DD results in the previous sub-section show that staying in a college town worsens employment outcomes for recent graduates along multiple dimensions, even when we use recent graduates from large metropolitan areas as a control group. However, a legitimate concern is that the effects on individual well-being might be overstated by the effects on nominal wages if college towns have lower costs of living than the destination areas of college town leavers. In other words, it might not make sense to compare the nominal wages of college town stayers to the nominal wages of college town leavers, large metro stayers, and large metro leavers if these latter groups live in more expensive areas. Assessing individual well-being requires comparing "real wages", that is wages adjusted for the local cost of living. Therefore, we next re-estimate the DD regressions in Table 6 while adding a control for the cost of living. We control for the cost of living by adding to the regressions a measure of average logarithmic differences in housing rental payments for each individual's current location computed using microdata from the 2000 Census. This measure, referred to as $Mean\ log\ rent$, is computed by regressing the log of gross rents, R, for each rental housing unit i in area j on a vector of housing characteristics, H, and a vector of area fixed-effects[5], π:

$$\ln R_{ij} = H_{ij}\Gamma + \pi_j + u_{ij}. \quad (3)$$

[5] Gross rents are measured to include certain utilities payments. For these purposes, areas are defined as metropolitan areas where they exist and state non-metropolitan areas for areas not part of a metro area.

The housing characteristics included are dummy variables for the number of bedrooms, the total number of rooms, the age of the structure, the number of units in the building, modern plumbing, modern kitchen facilities, and lot size for single-family homes. The results for this regression are available upon request. The area fixed-effects from (3) measure quality-adjusted average logarithmic differences in rents across areas and are used to control for differences in the cost of living across areas. One also could use housing values instead of rents to measure cost of living differences across areas, but Winters (2009) suggests that rents are a more appropriate measure of the cost of living.

Table 7 presents the results of adding $Mean\ log\ rent$ to the DD regressions to control for the cost of living in the current location. As seen in the first column of Table 7, $Mean\ log\ rent$ has a significant effect on the probability of employment with a coefficient of -0.025, but controlling for the cost of living does not meaningfully affect the main results for the probability of employment. $CollegeTown$ is again significant with a coefficient of 0.011, but $Stayer$ and the interaction term are again statistically insignificant. The result for the interaction term again suggests that staying in a college town after graduating does not affect the probability of employment.

The results of controlling for the cost of living in the log annual wage DD regression are reported in the second column of Table 7. As expected, $Mean\ log\ rent$ has a significantly positive effect on log annual wages with a coefficient of 0.389. This result suggests that a one percent increase in housing rents results in a roughly 0.4 percent increase in annual wages to compensate workers for the higher cost of living. Controlling for the cost of living also changes the effect of $Stayer$ on log annual wages. $Stayer$ had a significantly positive effect on log annual wages in Table 6, but after controlling for the cost of living the effect is significantly

negative with a coefficient of -0.018. This suggests that large metro stayers earn slightly lower annual wages than large metro leavers after controlling for the higher cost of living in large metro areas. Controlling for the cost of living, prior residence in a college town has a small and insignificant effect on annual wages. The interaction of $Stayer$ and $CollegeTown$ again has a significantly negative effect on log annual wages, but the coefficient of -0.203 is somewhat smaller than the corresponding estimate in Table 6. The implication is that after controlling for the cost of living, staying in a college town reduces annual wages for recent graduates by roughly 22.5 percent.

The third and fourth columns of Table 7 present the DD results for log hourly wages and log annual hours worked controlling for the cost of living. $Mean\ log\ rent$ has a significantly positive effect on log hourly wages with a coefficient of 0.416 but an insignificant effect on log annual hours, suggesting that for recent graduates the cost of living affects hourly wages but not hours worked. $Stayer$ again has a significantly positive effect on log hourly wages and a significantly negative effect on log annual hours with coefficients of 0.018 and -0.036, respectively. $CollegeTown$ now has an insignificant effect on both log hourly wages and log annual hours. The interaction of $Stayer$ and $CollegeTown$ has a statistically negative effect on log hourly wages with a coefficient of -0.175 and an insignificant effect on log annual hours.

The fifth column of Table 7 presents the results for the percent of workers in an occupation with a bachelor's degree or higher controlling for the cost of living. As seen, $Mean\ log\ rent$ has a statistically insignificant effect on the occupational education measure and controlling for the cost of living has no meaningful effect on the main results in the fifth column. $Stayer$ and $CollegeTown$ again have significantly positive effects with coefficients of 0.014 and 0.015, respectively. The interaction of the two again has a significantly negative effect with

a coefficient of -0.067, suggesting that staying in a college town forces recent graduates to accept jobs in less educated occupations.

5. Conclusion

College educated workers are an important ingredient for regional prosperity, and academics and policymakers are often interested in how areas can grow their stocks of human capital. Areas with a strong relative presence of colleges and universities are often thought to have an advantage in building their stocks of human capital because some recent graduates are likely to stay in the area where they attended college after they are done with school. Individuals choose to live and work in the location that gives them the highest possible utility, and many recent graduates wish to stay in the area where they completed their degree because they have developed location-specific human capital that increases the area's desirability. However, staying in the area where one attended college may require some sacrifice in employment opportunities, especially for persons attending college in relatively small college towns.

Using decennial census microdata for the U.S., this paper finds that recent graduates who stay in the college town where they earned their degree pay a considerable price for doing so. They earn lower annual and hourly wages and accept jobs in less educated occupations. Furthermore, the magnitudes of these effects are often quite large. The nominal difference in annual wages between college town stayers and leavers is roughly 30 percent. Even after controlling for the cost of living and treating recent graduates from large metro areas as a control group in an attempt to account for selection effects, staying in a college town still reduces annual wages by roughly 22.5 percent.

The implications for researchers and policymakers are clear. Colleges and universities can play a role in building the local stock of educated workers, but relatively small college towns often do not offer good employment prospects for recent college graduates. Some recent graduates will likely stay in the area because of attachments that they have developed, but those that stay are often forced to take lower paying jobs than they could get elsewhere Without a strong thick local market for educated labor, many recent graduates will leave the area after completing their education. Thus, while educational institutions can help build the local stock of human capital, the area needs to offer good employment opportunities for educated workers or else most recent graduates will leave once their education is complete.

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Table 1: The 41 "College Town" Metropolitan Areas Included in the Study

Albany-Corvallis-Lebanon, OR CSA	Kalamazoo-Portage, MI CBSA
Ames-Boone, IA CSA	La Crosse, WI-MN CBSA
Athens-Clarke County, GA CBSA	Lafayette-Frankfort, IN CSA
Bellingham, WA CBSA	Lansing-East Lansing-Owosso, MI CSA
Blacksburg-Christiansburg-Radford, VA CBSA	Las Cruces, NM CBSA
Bloomington, IN CBSA	Lawrence, KS CBSA
Bloomington-Normal, IL CBSA	Lewiston, ID-WA CBSA
Champaign-Urbana, IL CBSA	Lincoln, NE CBSA
Charlottesville, VA CBSA	Logan, UT-ID CBSA
Cheyenne, WY CBSA	Lubbock-Levelland, TX CSA
Chico, CA CBSA	Madison-Baraboo, WI CSA
College Station-Bryan, TX CBSA	Morgantown, WV CBSA
Columbia, MO CBSA	Muncie, IN CBSA
Columbus-Auburn-Opelika, GA-AL CSA	Provo-Orem, UT CBSA
Flagstaff, AZ CBSA	San Luis Obispo-Paso Robles, CA CBSA
Gainesville, FL CBSA	Santa Barbara-Santa Maria-Goleta, CA CBSA
Grand Forks, ND-MN CBSA	State College, PA CBSA
Greenville, NC CBSA	Tallahassee, FL CBSA
Hattiesburg, MS CBSA	Tuscaloosa, AL CBSA
Iowa City, IA CBSA	Waco, TX CBSA
Ithaca-Cortland, NY CSA	

Note: Metropolitan areas are classified as "college towns" if the share of the adult population (age 18 and older) enrolled in college is more than one standard deviation greater than the mean across all metropolitan areas.

Table 2: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Employed	0.923	0.267	0	1
Log Annual Wage	10.108	0.760	2.303	12.757
Log Hourly Wage	2.622	0.556	-3.219	7.058
Log Annual Hours	7.487	0.558	2.079	8.546
% of Occupation with Bachelor's or Higher	0.504	0.278	0.014	1
Stayer	0.194	0.396	0	1
Master's Degree	0.099	0.299	0	1
Professional Degree	0.032	0.177	0	1
Doctoral Degree	0.004	0.064	0	1
Age 24	0.176	0.381	0	1
Age 25	0.236	0.425	0	1
Age 26	0.246	0.430	0	1
Age 27	0.237	0.425	0	1
Female	0.553	0.497	0	1
Black	0.042	0.201	0	1
Asian	0.015	0.123	0	1
Hispanic	0.031	0.173	0	1
Other Nonwhite	0.013	0.114	0	1
Married	0.395	0.489	0	1
Has Children	0.141	0.348	0	1

Notes: The sample includes 11,237 individuals who resided in one of 41 college towns in 1995, who were no longer in school and had earned at least a bachelor's degree by 2000, were between the ages of 23 and 27 in 2000, and were born in the U.S.

Table 3: Differences in Means for Stayers and Leavers

Variable	Stayer Mean	Leaver Mean	Difference
Employed	0.911	0.925	-0.014**
Log Annual Wage	9.874	10.164	-0.290***
Log Hourly Wage	2.458	2.660	-0.202***
Log Annual Hours	7.416	7.503	-0.087***
% of Occupation with Bachelor's or Higher	0.481	0.544	-0.063***
Master's Degree	0.069	0.106	-0.037***
Professional Degree	0.026	0.034	-0.008**
Doctoral Degree	0.003	0.004	-0.002
Age 24	0.175	0.177	-0.002
Age 25	0.214	0.241	-0.027***
Age 26	0.222	0.251	-0.030**
Age 27	0.264	0.230	0.034***
Female	0.584	0.545	0.039**
Black	0.058	0.038	0.019***
Asian	0.008	0.017	-0.009***
Hispanic	0.030	0.031	-0.002
Other Nonwhite	0.013	0.013	-0.001
Married	0.422	0.389	0.032*
Has Children	0.216	0.123	0.094***

Note: *Significant at 10%; **Significant at 5%; ***Significant at 1%.

Table 4: Regression Results for Employment Outcomes

	Probability of Employment	Log Annual Wage	Log Hourly Wage	Log Annual Hours	% of Occupation with Bachelor's or Higher
Stayer	0.001	-0.267***	-0.209***	-0.058***	-0.052***
	(0.007)	(0.020)	(0.014)	(0.015)	(0.008)
Master's Degree	0.019**	-0.023	0.084***	-0.106***	0.157***
	(0.008)	(0.026)	(0.020)	(0.019)	(0.009)
Professional Degree	0.011	-0.132**	0.044	-0.176***	0.364***
	(0.013)	(0.053)	(0.041)	(0.041)	(0.016)
Doctoral Degree	0.038	0.065	0.199*	-0.134	0.258***
	(0.029)	(0.103)	(0.104)	(0.096)	(0.048)
Age 24	-0.003	0.190***	0.007	0.184***	0.002
	(0.010)	(0.032)	(0.024)	(0.026)	(0.011)
Age 25	-0.001	0.401***	0.108***	0.294***	0.015
	(0.009)	(0.031)	(0.022)	(0.025)	(0.010)
Age 26	0.003	0.479***	0.155***	0.324***	0.002
	(0.010)	(0.031)	(0.023)	(0.025)	(0.010)
Age 27	0.011	0.560***	0.175***	0.386***	-0.007
	(0.010)	(0.031)	(0.023)	(0.025)	(0.011)
Female	-0.034***	-0.208***	-0.115***	-0.092***	0.015***
	(0.005)	(0.015)	(0.011)	(0.011)	(0.006)
Black	-0.016	-0.082*	-0.001	-0.082**	-0.022
	(0.017)	(0.042)	(0.030)	(0.033)	(0.015)
Asian	-0.008	0.120	0.158**	-0.038	0.028
	(0.022)	(0.073)	(0.065)	(0.057)	(0.021)
Hispanic	-0.019	-0.012	0.052	-0.064*	-0.004
	(0.019)	(0.043)	(0.034)	(0.036)	(0.016)
Other Nonwhite	-0.032	-0.062	0.025	-0.087*	-0.065***
	(0.023)	(0.065)	(0.054)	(0.053)	(0.024)
Married	0.006	0.080***	0.053***	0.027**	0.030***
	(0.005)	(0.015)	(0.012)	(0.011)	(0.006)
Has Children	-0.172***	-0.263***	-0.031*	-0.232***	-0.015
	(0.012)	(0.030)	(0.018)	(0.025)	(0.010)
Observations	11237	10700	10700	10700	10368

Note: Heteroskedasticity robust standard errors in parentheses.
*Significant at 10%; **Significant at 5%; ***Significant at 1%.

Table 5: Differences in Means for Large Metro Area Stayers and Leavers

Variable	Stayer Mean	Leaver Mean	Difference
Employed	0.913	0.915	-0.001
Log Annual Wage	10.162	10.145	0.017
Log Hourly Wage	2.722	2.669	0.053***
Log Annual Hours	7.440	7.476	-0.036***
% of Occupation with Bachelor's or Higher	0.529	0.528	0.001
Master's Degree	0.090	0.110	-0.020***
Professional Degree	0.030	0.046	-0.015***
Doctoral Degree	0.004	0.005	-0.002**
Age 24	0.182	0.183	-0.001
Age 25	0.196	0.198	-0.002
Age 26	0.210	0.221	-0.011*
Age 27	0.246	0.242	0.005
Female	0.566	0.546	0.020***
Black	0.077	0.052	0.025***
Asian	0.049	0.045	0.003
Hispanic	0.069	0.042	0.027***
Other Nonwhite	0.017	0.026	-0.009***
Married	0.229	0.264	-0.035***
Has Children	0.089	0.083	0.006*

Notes: The sample includes 37,475 recent college graduates (27,661 Stayers and 9814 Leavers) who resided in one of 10 large metropolitan areas in 1995. Large metropolitan areas are defined as metro areas with a year 2000 total population of 5,000,000 or greater.

*Significant at 10%; **Significant at 5%; ***Significant at 1%.

Table 6: DD Regression Results for Recent Graduates from College Towns and Large Metros

	Probability of Employment	Log Annual Wage	Log Hourly Wage	Log Annual Hours	% of Occupation with Bachelor's or Higher
Stayer	0.000	0.024**	0.063***	-0.039***	0.014***
	(0.004)	(0.010)	(0.008)	(0.008)	(0.003)
CollegeTown	0.013***	-0.024*	-0.020**	-0.004	0.015***
	(0.004)	(0.012)	(0.009)	(0.009)	(0.004)
Stayer*CollegeTown	-0.002	-0.292***	-0.270***	-0.022	-0.068***
	(0.008)	(0.023)	(0.016)	(0.017)	(0.008)
Master's Degree	0.005	-0.020	0.074***	-0.094***	0.156***
	(0.004)	(0.013)	(0.010)	(0.010)	(0.004)
Professional Degree	-0.010	-0.042*	0.106***	-0.148***	0.300***
	(0.008)	(0.023)	(0.020)	(0.019)	(0.009)
Doctoral Degree	-0.070***	-0.069	0.084	-0.152***	0.277***
	(0.026)	(0.069)	(0.064)	(0.055)	(0.023)
Age 24	0.002	0.267***	0.052***	0.215***	-0.002
	(0.005)	(0.015)	(0.011)	(0.011)	(0.005)
Age 25	0.005	0.476***	0.170***	0.307***	0.010**
	(0.005)	(0.014)	(0.010)	(0.011)	(0.005)
Age 26	0.007	0.572***	0.221***	0.351***	0.002
	(0.005)	(0.014)	(0.010)	(0.011)	(0.005)
Age 27	0.019***	0.660***	0.268***	0.392***	-0.002
	(0.005)	(0.014)	(0.010)	(0.011)	(0.005)
Female	-0.015***	-0.163***	-0.082***	-0.081***	0.026***
	(0.003)	(0.008)	(0.006)	(0.006)	(0.003)
Black	-0.042***	-0.084***	-0.035***	-0.049***	-0.027***
	(0.007)	(0.017)	(0.013)	(0.013)	(0.006)
Asian	-0.041***	0.093***	0.156***	-0.063***	0.025***
	(0.008)	(0.022)	(0.017)	(0.018)	(0.007)
Hispanic	-0.026***	-0.074***	-0.047***	-0.027**	-0.014**
	(0.007)	(0.017)	(0.013)	(0.013)	(0.006)
Other Nonwhite	-0.028**	-0.113***	-0.063***	-0.050**	-0.032***
	(0.011)	(0.031)	(0.022)	(0.021)	(0.010)
Married	0.008***	0.107***	0.065***	0.042***	0.035***
	(0.003)	(0.008)	(0.007)	(0.006)	(0.003)
Has Children	-0.151***	-0.252***	-0.047***	-0.205***	-0.028***
	(0.007)	(0.017)	(0.011)	(0.013)	(0.006)
Observations	48712	46101	46101	46101	44614

Note: Heteroskedasticity robust standard errors in parentheses.

*Significant at 10%; **Significant at 5%; ***Significant at 1%.

Table 7: DD Regression Results Controlling for the Cost of Living

	Probability of Employment	Log Annual Wage	Log Hourly Wage	Log Annual Hours	% of Occupation with Bachelor's or Higher
Stayer	0.003	-0.018*	0.018**	-0.036***	0.014***
	(0.004)	(0.011)	(0.008)	(0.008)	(0.004)
CollegeTown	0.011***	0.007	0.013	-0.006	0.015***
	(0.004)	(0.012)	(0.009)	(0.009)	(0.004)
Stayer*CollegeTown	-0.007	-0.203***	-0.175***	-0.028	-0.067***
	(0.008)	(0.023)	(0.016)	(0.017)	(0.009)
Mean Log Rent	-0.025***	0.389***	0.416***	-0.027	0.003
(Current Location)	(0.008)	(0.023)	(0.017)	(0.017)	(0.008)
Master's Degree	0.005	-0.024*	0.070***	-0.094***	0.156***
	(0.004)	(0.013)	(0.010)	(0.010)	(0.004)
Professional Degree	-0.010	-0.044*	0.103***	-0.147***	0.300***
	(0.008)	(0.023)	(0.020)	(0.019)	(0.009)
Doctoral Degree	-0.070***	-0.061	0.092	-0.153***	0.277***
	(0.026)	(0.070)	(0.065)	(0.055)	(0.023)
Age 24	0.002	0.265***	0.051***	0.215***	-0.002
	(0.005)	(0.015)	(0.011)	(0.011)	(0.005)
Age 25	0.005	0.472***	0.165***	0.307***	0.010**
	(0.005)	(0.014)	(0.010)	(0.011)	(0.005)
Age 26	0.007	0.567***	0.215***	0.352***	0.002
	(0.005)	(0.014)	(0.010)	(0.011)	(0.005)
Age 27	0.019***	0.653***	0.261***	0.393***	-0.002
	(0.005)	(0.014)	(0.010)	(0.011)	(0.005)
Female	-0.015***	-0.164***	-0.083***	-0.081***	0.026***
	(0.003)	(0.008)	(0.006)	(0.006)	(0.003)
Black	-0.042***	-0.081***	-0.032**	-0.049***	-0.027***
	(0.007)	(0.017)	(0.013)	(0.013)	(0.006)
Asian	-0.038***	0.053**	0.113***	-0.060***	0.024***
	(0.008)	(0.022)	(0.017)	(0.018)	(0.007)
Hispanic	-0.024***	-0.095***	-0.070***	-0.026**	-0.014**
	(0.007)	(0.017)	(0.013)	(0.013)	(0.006)
Other Nonwhite	-0.026**	-0.135***	-0.086***	-0.048**	-0.032***
	(0.011)	(0.031)	(0.022)	(0.021)	(0.011)
Married	0.006**	0.126***	0.085***	0.040***	0.035***
	(0.003)	(0.008)	(0.007)	(0.006)	(0.003)
Has Children	-0.151***	-0.240***	-0.035***	-0.206***	-0.028***
	(0.007)	(0.017)	(0.011)	(0.013)	(0.006)
Observations	48712	46101	46101	46101	44614

Note: Heteroskedasticity robust standard errors in parentheses. *Significant at 10%; **Significant at 5%; ***Significant at 1%.