The Impact of State Tuition Gap on College Migration: Evidence from the Regional Reciprocity Agreements[*]

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31 October 2019

Abstract

This paper provides evidence that a drop in nonresident resident tuition gap increases college migration. I collect the regional reciprocity participating records for 51 states from 1958 to 2017, which I combine with census data on the college migration. I exploit exogenous variation in tuition gap resulting from participating status of the regional reciprocity agreement. I find that one percent decrease in nonresident tuition price of destination state due to the regional reciprocity agreements would on average increase nonresident students' inflow to the destination state by ranging from 0.5% to 0.4%. Having a regional reciprocity agreement between states would increase college migration between states by 21%. And this effect mainly happens through the channel of changing tuition gap.

1 Introduction

It is well known that nonresident students get charged a much higher tuition than residents in public postsecondary institutions in U.S. The tuition rate paid by nonresidents is often two to three times larger than that paid by residents. According to the IPEDS tuition data used in this study from 1986-2017, the average state ratio of nonresident to resident tuition in public postsecondary institutions is around 2.7 and it varies largely across states, for example, North Carolina has the highest ratio with 5.2 and New Jersey has the lowest ratio with 1.6. Given the rising of the overall college tuition and the limitation of voting power in state elections of nonresident students and their parents, this number could be even higher in the future. Meanwhile, tuition cost as a main part of cost of attendance has always been one of the most important concerns when students are deciding where and which college to attend. (HSLS:2009) Many students have to restrict their choices to the schools in their resident states out of financial concerns, which may not necessarily be the best fit schools for them. (Knight and Schiff, 2019) According to a study done by Snyder, Debrey, and Dillow (2018), there are more than 75% of students in U.S. studying in their own resident states. Therefore, it is straightforward to ask whether high out-of-state tuition price has become an obstacle for students in U.S. to studying out of state. If it is the case, then how many students who would study out of state get distorted study in state due to the large tuition gap between in-state and out-of-state tuition rates. If some policies reduce, eliminate, or even flip this gap, will more college migration respond as a possibility to explore more opportunities and even to get lower tuition?

The formation of regional reciprocity agreements is one such intervention that shed the light on this problem by exogenously changing the tuition prices in public institutions offered to

nonresidents among member states. In 1957-1958, the New England Board of Higher Education (NEBHE) established the first ever regional reciprocity agreement: Tuition Break, the Regional Student Program (RSP) to share higher education resources and expand educational opportunities for residents in New England area. With this agreement, nonresidents from the member states in the New England area can study in member states at a discounted tuition rate from the same rate as residents to at least no more than 150% of resident tuition rates depending on the state and program they attend. Since then, following the RSP, other regions in U.S. gradually launched similar regional reciprocity agreements of their own as well. The Southern Regional Education Board (SREB) launched the Academic Common Market (ACM) program in 1979; the Western Interstate Commission for Higher Education (WICHE) established the Western Undergraduate Exchange (WUE) program in 1988, and the Midwestern Higher Education Compact (MHEC) provides the Midwest Student Exchange Program (MSEP) in 1994. States in one region can join the regional reciprocity of that region on a voluntary basis. As of 2018, these regional reciprocity agreements cover 45 states in U.S. in total.[1] According to the annual report of Tuition Break of NEBHE, in the academic year 2018-2019, a full-time nonresident undergraduate saved an average of $7,900. However, these nationwide programs have led to very limited attention.

I exploit these agreements to estimate the effect of tuition on undergraduate college migrating. By using the regional reciprocity as an IV, I find that tuition matters and one percent decrease in nonresident tuition price of destination state due to the regional reciprocity agreements would on average increase nonresident undergraduates' inflow by ranging from 0.5% to 0.4%, while I

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[1] There are 6 states joining in the RSP; 14 states in the ACM; 15 states in the WUE, and 10 in the MSEP

observe there is no effects in the OLS regressions. Besides, the reduced form of controlling for agreements shows that the pairwise college migration flow between states with a reciprocity agreement is on average 21% higher than that of states without any reciprocity agreement. And this disparity in migration between those pairs of states with a reciprocity agreement and those without any reciprocity agreement is happening mainly through the channel of changing tuition gap.

My study proceeds from a novel self-collected panel data consisting the participating information of the four largest regional reciprocity agreements in U.S. since 1958. Using microdata from the 5% sample of 1960, 1970, 1980, 1990 and 2000 U.S. Census of population, I match pairwise college migration flows observed between states with the states' reciprocity agreement joining status and tuition price data from IPEDS. For each pair of source and destination states in the merged dataset, I can observe the pair-wise migration flow from the source state to the destination state, the existence of any reciprocity agreement between source and destination state, in-state tuition price for both source and destination states, out-of-state tuition price for both source and destination states, and other state-level economics and labor market information for both source and destination states, such as gross state production, unemployment rate, state and local government expenditure.

The challenge for identifying the causal effect of tuition gap on college migration is that tuition is endogenous, meaning it could be correlated with a lot of unobserved factors that are unable to be controlled, including the quality of education, state characteristics, economic conditions, and conditions in the state labor market. For example, tuition rates usually reflect educational quality

and the quality effect may offset the price effect. (Winters, 2012) That's why many studies find higher nonresident tuition has no effect on nonresident enrollment. (Mixon and Hsing, 1994; Baryla and Dotterweich, 2000) And besides the tuition gap difference, those pair of states with a high tuition gap might be systematically different from those pairs with a low tuition gap in many ways. It is hard to rule out other explanations without a credible empirical identification analysis. My identification strategy consists of three parts.

In the first part, I provide naive ordinary least squares (OLS) regressions of tuition gap on college migration. I add pair dummies(ie, two dummies for a pair of state (A,B): dummy (A, B) and dummy (B, A)) to control unobserved pair-specific, time-invariant effects that might be correlated with the pair's tuition gap, such as culture assimilation between states, location, climate, etc. The tuition gap of pair of states at a specific year might also be related with unobserved year-specific, but common across all pairs of states effects, such as economics cycles or year-specific macroeconomics conditions. I add year fixed effects to cancel out these effects. Tuition gap might also depend on unobserved trends that change with time and across states. I use source and destination state trend dummies to control for those unobserved linear trend effects. If the assumption that the only obstacles of estimating tuition gap of a pair of states unbiasedly are these effects mentioned above is satisfied, then the OLS result controlled pair fixed effects, year fixed effects, and source and destination state specific trend would be unbiased. Given the measurement error won't be an issue because all variables in this study are state-level data, then, the only concern left would be heterogeneity problem, that is college migration may respond differently in pairs with high tuition gap than pairs with low tuition gap. However, tuition gap between a pair of states might be still related to both pair-variant and time-variant factors, such as education quality,

industrial structure change, demographic composition change, etc. Therefore, the effect estimated from OLS regressions might be biased.

To address the endogeneity and heterogeneity concern, the second part of my analysis is to apply an instrumental variable strategy based the state participating process of regional reciprocity agreements. I argue that this instrumental variable satisfies the two requirements for an instrument. Firstly, this instrument is highly correlated with the endogenous variable, here in my case is tuition gap, because the content of tuition reciprocity agreement is to reduce tuition price for nonresident students, therefore pairs with a reciprocity agreement would have a lower tuition gap than pairs without. Secondly, I argue that this instrument seems unlikely to be correlated with other factors that also might impact interstate migration of college student. From the history of regional reciprocity agreements, I find that although states join the regional reciprocity agreements on a voluntary basis, the initial time and setup of a regional reciprocity agreement is decided by regional education unions states belong to not by state itself, which is unlikely to be correlated with college emigration or immigration in a specific state. Besides, the bilateral characteristics with multiple states simultaneously make it even harder for a state to join the regional reciprocity agreement in reacting to changes in undergraduate migration because states working as the source states work as the destination states as well make the overall net migration ambiguous. Furthermore, since the time point of joining most regional reciprocity agreements is at least 1 year ahead before the academic year, it is unlikely to be correlated with factors after academic year. Lastly, according to the participation information I gathered, most states join the agreements as long as it is release, for example, all states in NEBHE joined the TB in 1958, and all most all states keep staying in the agreements after they first joined (except for North Carolina, which joined ACM in 2001 and left

by 2011). This consist participation characteristic makes it unlikely to correlated with factors change both over time and across state. Therefore, I think after controlling for pair and year fixed effects and source and destination specific trends, the shock to the tuition gap brought by participating a reciprocity agreement can be viewed as exogenous. I take advantage this variation induced by the state and time differences in joining the regional reciprocity agreement to isolate the tuition gap's causal effect on college migration and solve the endogeneity problem. Besides, I also interpret my instrumental results through the lens of heterogeneity. Since there is no state would increase its nonresident tuition when joining the reciprocity agreement while reducing the tuition when not joining, my IV satisfies the monotonicity requirement. Therefore, the effect identified by my IV is a LATE (the local average treatment effect) among "complies". And complies in my study refer to those pair of states, who would not have lowered tuition gap without signing the reciprocity agreements, lower the tuition gap due to the reciprocity agreement. The effects estimated by my IV, in all specifications, have flipped signs and substantially stronger magnitude than the ATE (the average treatment effects) estimated by the naïve OLS regressions. This suggests the existence of selection bias: those pairs with high tuition gap have more college migration than pairs with low tuition gap in the first place, therefore, the effect of tuition on enrollment from the OLS is biased.

To explore more about the exogeneity and learn more about the reciprocity agreement program, I provide a reduced form evaluation of the regional reciprocity agreements program on college migration using fixed effects model. The coefficient results from this program evaluation reduced form identifies the overall effect from the regional reciprocity agreement. I argue that this reduced form complements the IV results. Firstly, the LATE identified by IV is of more scientific interest,

while the effect from the reduced form of the policy is more straightforward and useful for policy. Secondly, the effects estimated by the reduced form is a little larger than the LATE estimated by my IV suggests that there exists other factor through which the program impacts the college migration, but it mainly does through changing tuition.

My work contributes to the literature in several ways. Firstly, many researchers have attempted to measure the effect of tuition on enrollment. Leslie and Kane (1994) and Card and Lemieux (2000) find that tuition level has no statistically significant effects on enrollment after controlling for the state fixed effects. This result is consistent with the results that I get from my OLS regression, which I argue is biased because a higher tuition might be a signal of a higher education quality, which would affect enrollment as well. Later on, with the growth of merit base scholarship, a long literature has been attracted by studying its effect on college enrollment. Dynarski (2004) find that $1,000 in aid ($1998) increased the college attendance rate in Georgia by 3.7 to 4.2 percentage points. Cornwell, Mustard and Sridhar (2006) compare Georgia with other southeastern states over the 1988-1997 period and find that HOPE increased freshmen enrollment by 5.9%. Kane (2007) evaluates the DC Tuition Assistance grant program and he finds that 10,000 dollars decrease in tuition price is associated with 15% increase in enrollment. While my results show that 1% decrease in tuition price, which is around 47 dollars is associated with 0.44% increase in enrollment, thus 10,000 dollars decrease in tuition would associate with around 88% increase in enrollment (It is supposed to be smaller because the additional effect from one extra dollar probably would decrease with money.) and the effect of the reciprocity agreement is around 21% increase in nonresident enrollment. Firstly, tuition variations induced by merit based are endogenous because students wining the scholarship have better academic performance which

might be reflected some student personal characteristics that are hard to control. However, the reciprocity agreement is location basis and has nothing to do with the student performance, thus it can better solve this endogeneity issue. Secondly, the effect found in mine is larger than most results find via merit base scholarship. However, the effect found by changes in in-state tuition and that found by out-of-state tuition might not be comparable with each other. Dotterweich and Baryla (2005) and Adkisson and Peach (2008) find that there is no effect of merit base scholarship on out-of-state college migration. Thirdly, I use Census data covering nationwide states from 1960-2000, while Dynarski (2004), Mustard and Sridhar (2006) and Kane (2007) focus on a rather small and special group of people, thus the effects is hard to be generalized. Secondly, given its nationwide spread and longtime existing of the regional reciprocity agreements, there is surprisingly little research studying the impact of this program. Marsicano (2015) is the only paper that studies the effect of the regional reciprocity agreements. The author studies the out-of-state enrollment in institutions located in the border of states and finds that participation of a reciprocity agreement on average increases the out-of-state student enrollment in those institutions of membership states by 100% using OLS regressions. My result (around 20%) is much smaller than his. I argue that my analysis makes a huge improvement by using state pair and is more convincing than his. Firstly, the unit of observation in his study is institution and the variable of interest is whether the institution belongs to a reciprocity membership state. The lack of source information about the student inflow makes it hard to control source state characteristics which are highly likely to have effects on both enrollment and reciprocity agreement participation. Instead, I use state pair as my unit of observation. Including source and destination states allows me to add more controls for both source and destination states to reduce the endogeneity problem. Besides, State-level data also can help with reducing the endogeneity and heterogeneity problems of institution-level data,

given he even didn't control for institution fixed effects. Secondly, the sample periods covered in his study is 2003 to 2012, a period when the state reciprocity participating status doesn't change much, while my study covers a much longer period starting from 1960 and most importantly, I cover the period before 1994 when there are more variations of participating. Thirdly, my study put the reciprocity agreement in the tuition context and use it as an instrument variable such that I can identify LATE and show the channels of changing tuition price is the main channel through which the reciprocity agreements effect on college migration.

2 Data

I use four sources of data in this analysis. Firstly, I use 5% sample of 1960-2000 Census data from IPUMS for the migration and demographic information of undergraduate students who enroll in public universities. I exclude college students who are above 30 to increase accuracy. For each undergraduate student, I can get the current state he is in the referring census year and the state he was at five years ago ahead of the referring census year.[2] If these two states are not the same, then I count this student as one valid college migration and I define his current state as the destination state while the state he was five year ago as the source state. I aggregate the number of college migration by each ordered pair of states in U.S. by each Census year. There are 12750 ordered pairs (2550 per year*5 year) in total in my sample and 28% (3566) pairs among them have zero college migration.

Secondly, I collect the state reciprocity agreement participating information by checking websites and contacting program directors. This dataset includes the information of the four biggest regional reciprocity agreements and participating time of each state from 1958 to 2018. Thirdly, I get the tuition information data from the 1980 and 1984-2017 IPEDS dataset.[3] The unit of observation in the IPEDS dataset is institution. This dataset includes the important variables such as out-of-state tuition and in-state tuition for each institution. However, the data for DC in 1984 is missing. I average the institution-level out-of-state tuitions and in-state tuitions separately by state to get the average state level tuitions for both nonresidents and residents. Finally, I add more control

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[2] I exclude Census 2010 and after because after 2000 census changed the referring span of migration from 5 years to 1 year, which makes the migration information before and after 2000 Census not that comparable to each other.
[3] The 1981~1983 IPEDS data is unavailable.

variables by using gross state product (GSP) ranging from 1962 to 2017 from the Bureau of Economic Analysis (BEA).[4]

I get unemployment rate ranging from 1976 to 2017 from the Bureau of Labor Statistics (BLS). The years before 1976 are not available in BLS. Therefore, I also construct the state unemployment rate from 1960 to 2000 using Census 1960-2000. In order to make sure the unemployment rate is comparable; I use state unemployment rate from BLS in the IV regressions which only cover year after 1980 and use the state unemployment rate computed by Census for the reduced form analysis. I collect government education expenditure ranging from 1960 to 2017 from the Annual Survey of State and Local Government Finances. However, the 2001 and 2003 data is missing.

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[4] The limitation of this gross state product data is: 1) GSP 1960 is not available; I tried to extend the period to 1960 by predicting 1960 data using GSP in and after 1970 using the following equation:

$$\log(GSP_{st}) = \beta \log(GDP_t^{US}) * Region_s + unemployment\ rate_{st} + \log(population_{st}) + \gamma_s$$
$$+ t + \epsilon_{st}$$

Where "s" stands for state, "t" stands for census year. "$Region_s$" stands for the census region dummy. "γ_s" stands for a set of state dummies. 2) The calculation has a discontinuity in year 1997. The gross state product before 1997 is based on the Standard Industrial Classification (SIC) and years after 1997 is based on the North American Industry Classification System (NAICS). These two systems are not comparable with each other. To deal with this discontinuity, I interact the gross state product with a dummy which is 1 for years after 1997 and 0 otherwise in my following analysis.

I define a new variable named "Log tuition gap" to measure the log of difference in tuition between source and destination state. The definition equation is: [5]

$$Log\ tuition\ gap_{sdt}$$

$$= \begin{cases} log(resident\ tuition_{dt}) - log(resident\ tuition_{st}), & Reciprocity_{sdt} = 1 \\ log(nonresident\ tuition_{dt}) - log(resident\ tuition_{st}), & Reciprocity_{sdt} = 0 \end{cases}$$

Where "$Reciprocity_{sdt}$" is the reciprocity agreement dummy, it equals 1 if the state pair (s,d) have any reciprocity agreement with each other in year t; otherwise it equals 0. "$resident\ tuition_{st}$" stands for the average in-state tuition in source state "s" in year "t". "$resident\ tuition_{dt}$" stands for the average in-state tuition in destination state "d" in year "t". "$nonresident\ tuition_{dt}$" stands for the average out-of-state tuition in destination state "d" in year "t".

Table 1.1 shows the means of number of college students migrating between pairwise states, gross state product, state and local government expenditure toward education, and state unemployment rate of both source and destination states for pairs of states used in the reduce form regressions. Column 1 shows means for the whole samples ranging from 1960 to 2000. There are 12750 pairs in my sample and among them, 28% (3566) pairs have zero college migration. Among 9184 pairs of states having positive college migration number, 883 (9.6%) of them have a reciprocity agreement. Column 2 and 3 show more details of how number of college students migrating

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[5] Note: Having a reciprocity agreement between A and B doesn't in general imply tuition gap of zero. The existence of the reciprocity agreement only allows resident from A to pay B's in-state tuition (rather than B's out-of-state tuition when absent of agreement) when studying in B. The tuition gap then reflects any difference in in-state tuition.

between pairs of states vary by whether or not having a reciprocity agreement. Firstly, the average number of students migrating between pairwise states with any reciprocity agreement is 459, while the average number for those pairs of states without any reciprocity agreement is lower and only 346. Secondly, the average state and local government expenditure of both source and destination states for those pairs with a reciprocity agreement are a little higher than those without any reciprocity agreement. Thirdly, the average unemployment rate of both the source and destination states are quite similar between pairs with a reciprocity agreement and pairs without. Finally, the average state gross production of both the source states and destination states of pairs with any reciprocity agreement are slightly lower than those without any reciprocity agreement.

Table 1.2 shows the table of means of tuition gap, the number of college students migrating between pairwise states, gross state product, state and local government expenditure toward education, and state unemployment rate of both source and destination states for pairs of states that I use in my OLS and IV analysis. Column 1 shows means for the whole samples ranging from 1980 to 2000. There are 7650 pairs in my sample and among them, 17% (1365) pairs have zero college migration. Among 6285 pairs of states having positive college migration, 835 (12.3%) of them have a reciprocity agreement. Column 2 and 3 show more details of how number of college students migrating between pairs of states vary by whether or not having a reciprocity agreement. Firstly, the average tuition gap of pairs with a reciprocity agreement is 0.01 while the average tuition gap for pairs without any reciprocity agreement is 0.5, which is much higher than states with reciprocity agreements. Secondly, the average number of students migrating between pairs with a reciprocity agreement is higher than pairs without any reciprocity agreement. Thirdly, the average state and local expenditure of both source and destination states for those pairs with a

reciprocity agreement is lower than those pairs without any reciprocity agreement. Fourthly, the average unemployment rate of both source and destination states for pairs with a reciprocity agreement is lower than those pairs without any reciprocity agreement. Lastly, the average gross state product of both source and destination states for pairs with a reciprocity agreement is lower than those pairs without any reciprocity agreement, which is true both for years before 1997 and years after 1997.

3 Methodology

3.1 OLS and IV models

I use the ordinary least squares (OLS) regressions to estimate the effect of tuition gap on college migration. The OLS regression equation is:

$$\log (M_{sdt}) = \theta_1 Log\ tuition\ gap_{sdt} + \theta_2 x_{st} + \theta_3 x_{dt} + \alpha_{sd} + \tau_t + \varepsilon_{sdt}$$

Where "s" indicates source state, "d" indicates destination state, and "t" indicates census year. "M_{sdt}" is the number of college students moving from the source state "s" to the destination state "d" in census year "t". "x_{st}" stands for control variables for source state. It includes log gross state product to control source state economics condition, state and local government education expenditure to control source state government's revenue and government policy, and unemployment rate to control source state labor market condition. "x_{dt}" stands for the same kind of control variables for destination state. "α" stands for ordered pair fixed effects to control for time invariant ordered pair specific variables, such as location, climate. "τ" stands for time fixed effects to control for time-varying but common across ordered pair factors, such as national policy, national business cycle. "ε" is the error term. All the standard errors are clustered by pairs of states. The "Log $tuition\ gap_{sdt}$" defined before stands the difference in log tuition prices between the source state "s" and the destination state "d" in year "t".

Both previous literature and the theoretical framework suggest that tuition is very likely to be endogenous. Although fixed effects get controlled, there are still some unobserved quality

variables, or economics variables uncontrolled by GSP that are correlated with tuition. Therefore, the effect estimated from the OLS regressions might be biased.

To address the endogeneity and heterogeneity concern, I further apply the reciprocity agreement dummy as an instrumental variable. For the IV to be valid, the IV must be highly correlated with the endogenous variable and affect the outcome only through the endogenous variable. It is obvious that the nonresident and resident tuition gap gets smaller with reciprocity agreement by reducing the nonresident tuition price. Besides, joining the reciprocity agreements or not is not influenced by college migration. Firstly, the very first starting year of a regional reciprocity agreement is initially decided by regional education union, not state government itself, to increase education efficiency and lower education cost and most states just join the agreements since the first year. Secondly, usually policymakers are very interested in increasing the number of educated persons in their states and increase the number of college immigration would be their favorable strategy with the hope that these immigration students would join the local labor market after college. However, since the reciprocity is a bilateral agreement with multiple states, it is very hard to be used by policymakers to manipulate net student flow. Many straightforward strategies are available to be used rather than reciprocity agreements. Besides, as to 2017, there are 45 states participating some regional reciprocity agreement and almost all of them never quit the agreement since they join. Given that the net college migration is a zero-sum game, some states gain more students along with other states lose. If joining reciprocity is a decision driven by decreasing college migration trend, then those states gain negative student flow would quit, however, it seems not the case.

3.2 the Reduced form models

I use fixed effects regressions to evaluate the impact of regional reciprocity agreement. The main regression equation is:

$$\log(M_{sdt}) = \beta_0 + \beta_1 Reciprocity_{sdt} + \beta_2 x_{st} + \beta_3 x_{dt} + \alpha_{sd} + \tau_t + \varepsilon_{sdt}$$

Where M_{sdt} is the number of college students moving from state "s" to state "d" in census year "t", "s" indicates the source state, "d" indicates the destination state, and "t" indicates the year. "x" are control variables, which include log of gross state product for both source and destination states, log of state and local government expenditure for both source and destination states, and unemployment rate for both source and destination states. "α" stands for pair fixed effects. "τ" stands for time fixed effects. "ε" is the error term. "$Reciprocity_{sdt}$" is the reciprocity agreement dummy, it equals 1 if the state pair (s,d) have any reciprocity agreement with each other in year t; otherwise it equals 0. The coefficient "β_1"in front of "Reciprocity" dummy is the effects of interests that whether having a reciprocity agreement on college migration between two states. And all the standard errors are clustered by pairs, i.e. the number of groups is equal to the number of pair and a pair (s, d) is viewed as a different group from a pair (d, s).

4 Results

4.1 OLS and IV results

Table 3 presents the ordinary least squares (OLS) regression results and the IV regression results. Four specifications with increasingly detailed controls for the OLS results are presented across columns 1 to 4 left to right. And the same specifications are presented for the IV results in columns 5 to 8 left to right. All the regressions include the Log Tuition Gap variable, which is the main variable of interest in this paper. The base specification (column 1 and column 5) controls for the ordered pair fixed effects, and year fixed effects to cancel out effects of ordered pair specific factors that are invariant over the time, such as, location, climate, etc. , and effects of year specific factors that are the same across the ordered pairs, such as nationwide business circle, policy etc. In columns 2 and column 6, I add first the log gross state product of both source and destination states to control for the state economics condition, the log state and local education expenditure for both source and destination states to control for the state government revenue capacity and policy choice, and the unemployment rate for both source and destination states to control for the state labor market condition. In columns 3 and column 7, I include more dummies to control for source state specific trends and destination state specific trends. In columns 4 and column 8, instead of source and destination state specific trend dummies, I add specific trend dummies for each ordered pair of states.

4.1.1 OLS results

None of the coefficients of Log Tuition Gap is statistically significant in the OLS results. The coefficient of Column 1 is 0.04 and it is statistically insignificant. This shows that a one percent

increase in the nonresidents' tuition price in the destination state of an ordered pair of states almost has no effect on its nonresident undergraduate inflow. Adding more controls in Column 2 to 4 doesn't change the magnitude of the coefficient a lot, but gradually increases its standard error, which make the coefficients even more insignificant. Overall, the results observed from the OLS regressions of tuition gap suggests that there is no effect of tuition on college migration, in other words, a decrease in the nonresident tuition in the destination state wouldn't help it attract more nonresident students, which is inconsistent with the law of demand. This OLS result suggests the endogeneity of nonresident tuition price. This endogeneity could come from time variant and ordered pair various variables that are unable to be controlled in the model, such as state education quality, state demographic structure change, etc. It could also come from the capacity change of nonresident students from the supply side, that is to say, the number of nonresidents institution would like to supply decreases in respond to the price drop, which offsets the price effect.

4.1.2 IV results

To fix the endogenous problems of tuition price, Columns 5 to 8 present the IV results with the second stage results in the upper rows and the first stage results below. [6]

The coefficient on the reciprocity variable in the first stage in column 5 in Table 2 is -0.36 and it is statistically significantly at 1% level. This coefficient shows that having a reciprocity agreement

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[6] The frequency of observations used in the first stage results presented in Table 2 is census year by default because that is the outcome variable "college migration" (M_{sdt}) is measured at. I also checked using annual data for the first stage. There is not much difference. I think this result make some sense since state fixed effects is usually thought to pick up low frequency variation (low frequency means variation happening at the 5-10 year frequency), thus using annual data won't create more variation in the fixed effect model. That results are available in Appendix Table A2 and A3.

between an ordered pair of states can significantly reduce its nonresident tuition price in destination state by 36%. The F statistic in column 5 is 1387 meaning that we can reject the null hypothesis that there is no effect of the IV on the endogenous variable and the effect is quite strong. Adding more controls of source and destination states economics characteristics in column 6 renders the first stage coefficient on reciprocity variable to -0.39, a bit large in absolute value and the F statistics drop to 548, which suggests that the coefficient actually doesn't change much given the standard error in the base setting is 0.03 (within twice the standard errors on both side). Adding source states specific trends and destination states specific trends in column 7 reduces the coefficient to -0.26 and increases the F statistic to 1800. This result is statistically significantly smaller (less negative) than previous column given the standard error is 0.03. This fall suggests that part of the effect on the tuition gap seemed due to the reciprocity agreements is actually due to the source and destination specific trends. Lastly, adding ordered pair specific trends in column 8 makes the first stage coefficient even weaker. The coefficient drops to -0.17. If we consider the 95% confidence intervals to be twice the standard errors on both sides, it looks like this coefficient is statistically significantly smaller (less negative) than results in previous columns. This fall in the coefficient seems to mean that the reductions in tuition gap that seemed due to the reciprocity agreement is actually due to the ordered pair specific trends.

Given that the average nonresident tuition price of destination states with reciprocity agreement in the sample is 5220 dollars, a 39% to 17% decrease means a price decrease of about 1879 to 887 in dollar. Thus, according to the first stage a student can save on average around 1878 to 887 dollars per academic year when study out of study thanks to the reciprocity agreements. This is not a small amount of money especially given the fact that undergraduate study usually takes at least four

years. Overall, all these first stage coefficients on the tuition gap are consistently negative and statistically significant at 1% level along with quite large F statistic suggests that the reciprocity agreements benefits students by decreasing nonresident tuition price, thus my IV satisfies the requirement that an IV should be highly correlated with the endogenous variable.

The coefficient of log tuition gap in the second stage in column 5 is -0.49 and it is statistically significant at 1% level. This coefficient shows that a one percent decrease in the nonresident tuition price for the destination state in an ordered pair of states would increase college inflow into that state by 0.49%, which is consist with the demand law. Adding the source and destination state characteristics in column 6 keeps the sign but drops the absolute value of the coefficient a little from 0.49 to 0.40. The coefficient is still statistically significant at 1% level. Given the standard error is 0.13, this specification actually doesn't change the coefficient very much. Adding source and destination states specific trends in columns 7 renders the coefficient of reciprocity variable drop to -0.36 and reduces its' statistically significant level into 10%. Again, given the standard error, it shows that the coefficient doesn't change much. Adding ordered pair specific trends in column 8 flips the sign of the coefficient but it is not statistically significant.

The wild change in the coefficient of the log tuition gap in column 8 seems to suggest that the increasing in college migration that seemed to be due to the reduction in tuition gap is actually due to the ordered pair specific trends. However, I don't prefer this specification. Firstly, there are only three periods in this IV analysis. Although to estimate a model with state-specific trends we at least need three periods in theory, but Angrist and Pischke (2009) points out that three periods is typically inadequate to pin down both the trends and the treatment effect in practice. Secondly, the

number of ordered pair specific trends is too large to be controlled. I have 2550 ordered pairs while the number of observations is only 6286 in this IV analysis. Therefore, adding ordered pair specific trends adds way too much controls that reduces the degree of freedom a lot and make the model lack of variation. This specification is very likely to have overidentification problem.

Overall, given the average nonresident tuition in my sample is 5220 dollars and the average college migration number is 473, the coefficient on the log tuition gap is from -0.36 to -0.49 meaning that 52 dollars decrease in nonresident tuition would increase the undergraduate inflow by about 2 students. This effect is relatively large in the literature, compared with the effect of a 0.07% increase in enrollment in Kane (2007).

4.2 Reduced form results

Table 4 presents the reduce form analysis results. The first four specifications are the same as the previous IV analysis. Column 1 in Table 4 shows that the coefficient of the reciprocity agreement dummy is 0.2 and it is statistically significant at 1% level. This suggests that the reciprocity agreement between an ordered pair of states would help the ordered pair increase 20% in undergraduate flow from its source state to its destination state. Adding source and destination states specification in column 2 doesn't change the coefficient. Adding source and destination specific trends in column 3 increase the coefficient from 0.2 to 0.25 and it is statistically significant. Given the standard error is 0.04, 0.25 still lies within the twice standard errors, thus it is not statistically significantly larger. Therefore, the effect so far is quite robust across the different specifications. Adding ordered pair specific trends keeps the sign but drops the coefficient a lot to 0.07. It is not statistically significant. This suggests that there is almost no effect of the reciprocity agreement on college migration. Again, I don't prefer this specification because adding too much controls (2550 trends) make the model lack of variation.

In order to compare the reduced form results with the IV results, in column 5 in Table 3, I redo the specification of column 3 using census year 1980, 1990 and 2000 only, which is the sample that I use for my IV analysis. The coefficient of the reciprocity agreement dummy in column 5 is 0.1 and it is statistically significant at 10%. This coefficient is only half large and the coefficient using the whole Census 1960, 1970, 1980, 1990, and 2000 sample. This result shows that having a reciprocity agreement of an ordered pair of states would increase the nonresident inflow from the source state to destination state by 10%. The corresponding specification in IV analysis is in column 7 in Table 2. Its second stage shows that 1% decrease in destination state nonresident

tuition would decrease the college inflow from source to destination state of an ordered pair of states by 0.36%, while the first stage suggests that having a reciprocity agreement would decrease the nonresident tuition price in the destination state by 26%. To calculate the impact of having reciprocity agreement between an ordered pair of states on college migration, I multiplied the coefficient on the log tuition gap by 26. Thus, having reciprocity agreement would increase its destination nonresident inflow by 9.36% (=26*0.36%) and the same for the standard error, which is very similar to the effect (10%) getting from the reduced form given the standard error 0.05. This comparison shows that the effects found in IV results and the effects found in the reduced form are quite similar both in terms of estimate and standard error, thus I conclude that the reciprocity agreements affect the college migration mainly through the channel of changing tuition.

More results of the coefficients of the control variables are presented in Appendix Table A1. The coefficients of destination state GSP and source state unemployment rate have a consistent sign and are consistently significant at 1% level, which make them worth more noting. The coefficient on destination state GSP is around 0.25, which shows that a one percent increase in destination state GSP would attract the college inflow to that state by 0.25%. The coefficient on source state unemployment rate is around 3, which shows that a one percent increase in source state unemployment rate would increase the outflow of its undergraduate students to study out of state by 3%. This result suggests that a promising state economics condition in destination state (reflected by destination state GSP) and the unsatisfying source state labor market condition (reflected by source state unemployment rate) could be another two important factors that increase college migration.

5 Conclusion

6 Reference

Abraham, K. G., and Clark, M. A. (2006). Financial aid and students' college decisions evidence from the District of Columbia Tuition Assistance Grant Program. Journal of Human resources, 41(3), 578-610.

Card, D., and Lemieux, T. (2000). Dropout and enrollment trends in the post-war period: What went wrong in the 1970s? (No. w7658). National Bureau of Economic Research.

Castleman, B. L., and Long, B. T. (2016). Looking beyond enrollment: The causal effect of need-based grants on college access, persistence, and graduation. Journal of Labor Economics, 34(4), 1023-1073.

Cohodes, S. R., and Goodman, J. S. (2014). Merit aid, college quality, and college completion: Massachusetts' Adams scholarship as an in-kind subsidy. American Economic Journal: Applied Economics, 6(4), 251-85.

Cornwell, C., Mustard, D. B., and Sridhar, D. J. (2006). The enrollment effects of merit-based financial aid: Evidence from Georgia's HOPE program. Journal of Labor Economics, 24(4), 761-786.

Dynarski, S. (2000). Hope for whom? Financial aid for the middle class and its impact on college attendance (No. w7756). National bureau of economic research.

Dynarski, S. (2004). The new merit aid. In College choices: The economics of where to go, when to go, and how to pay for it (pp. 63-100). University of Chicago Press.

Greenwood, M. J. (1997). Internal migration in developed countries. Handbook of population and family economics, 1, 647-720.

Groen, J. A. (2004). The effect of college location on migration of college-educated labor. Journal of Econometrics, 121(1-2), 125-142.

Hunt, J. (2006). Staunching emigration from East Germany: Age and the determinants of migration. Journal of the European Economic Association, 4(5), 1014-1037.

Kane, T. J., and Rouse, C. E. (1995). Labor-market returns to two-and four-year college. The American Economic Review, 85(3), 600-614.

Kane, T. J., and Rouse, C. E. (1999). The community college: Educating students at the margin between college and work. Journal of economic Perspectives, 13(1), 63-84.

Kane, T. J. (2007). Evaluating the impact of the DC tuition assistance grant program. Journal of Human resources, 42(3), 555-582.

Knight, B., and Schiff, N. (2019). The Out-of-State Tuition Distortion. American Economic Journal: Economic Policy, 11(1), 317-50.

Leslie, L. L., and Brinkman, P. T. (1988). The Economic Value of Higher Education. American Council on Education/Macmillan Series on Higher Education. Macmillan Publishing, 866 Third Avenue, New York, NY 10022.

Malamud, O., and Wozniak, A. (2012). The impact of college on migration evidence from the Vietnam generation. Journal of Human resources, 47(4), 913-950.

Marsicano, Christopher Russell. (2015). "Regional state tuition exchanges and out-of-state enrollment at public universities and community colleges." https://www.researchgate.net/profile/Christopher_Marsicano/publication/272181353_Regional_s tate_tuition_exchanges_and_out-of- state_enrollment_at_public_universities_and_community_colleges/links/54de85a70cf29666378c 0aa/Regional-state-tuition-exchanges-and-out-of-state-enrollment-at-public- universitiesandcommunity-colleges.pdf.

Rouse, C. E. (1994). What to do after high school: The two-year versus four-year college enrollment decision. Choices and consequences: Contemporary policy issues in education, 59-88.

Saks, R. E., and Wozniak, A. (2011). Labor reallocation over the business cycle: New evidence from internal migration. Journal of Labor Economics, 29(4), 697-739.

Sjoquist, D. L., and Winters, J. V. (2015). State merit aid programs and college major: A focus on STEM. Journal of Labor Economics, 33(4), 973-1006.

Snyder, T. D., De Brey, C., and Dillow, S. A. (2018). Digest of Education Statistics 2016, NCES 2017-094. National Center for Education Statistics.

Wozniak, A. (2010). Are college graduates more responsive to distant labor market opportunities?. Journal of Human Resources, 45(4), 944-970.

Zhang, L., and Ness, E. C. (2010). Does state merit-based aid stem brain drain?. Educational Evaluation and Policy Analysis, 32(2), 143-165.

7 Tables

Table 1: Means: sample for the IV analysis

	All	Reciprocity=1	Reciprocity=0
Panel A: Census& IPEDS 1980-2000			
Log tuition gap*	0.44	0.01	0.50
	(0.63)	(0.44)	(0.63)
College migration from souce to destination	403.86	473.37	393.21
	(729.22)	(690.38)	(734.47)
State and local expenditure (source)	1770.88	1418.77	1824.83
	(2280.62)	(2367.26)	(2262.44)
State and local expenditure (destination)	1777.81	1424.68	1831.91
	(2279.75)	(2366.55)	(2261.51)
Unemployment rate (source)	5.36	5.10	5.40
	(1.73)	(1.57)	(1.75)
Unemployment rate (destination)	5.36	5.13	5.39
	(1.72)	(1.57)	(1.74)
Gross state product (source)	136918.96	99254.58	142689.55
	(186295.33)	(179449.42)	(186667.78)
Gross state product (destination)	136862.73	99565.23	142577.12
	(186181.71)	(179379.59)	(186560.30)
Observations	6285	835	5450

Notes: Unweighted means, standard deviations in parentheses. The sample is college students aged under 30 who study in public school from Census year 1980-2000. Gross state product and state and local government expenditure is in millions of current dollars. The years before 1997 is based on the Standard Industrial Classification (SIC) and years after 1997 is based on the North American Industry Classification System (NAICS).

$$*Log\ tuition\ gap_{sdt} = \begin{cases} log(resident\ tuition_{dt}) - log(resident\ tuition_{st}), & Reciprocity_{sdt} = 1 \\ log(nonresident\ tuition_{dt}) - log(resident\ tuition_{st}), & Reciprocity_{sdt} = 0 \end{cases}$$

Unemployment rate is collected from Bureau of labor statistics (BLS)
Source: Census 1980-2000& IPEDS 1980, 1984-2017& BLS 1976-2017& BEA 1962-2017.

Table 2: Means: sample for the reduced form analysis

	All	Reciprocity=1	Reciprocity=0
Panel B: Census 1960-2000			
College migration from souce to destination	357.64	459.96	346.76
	(653.80)	(677.15)	(650.36)
State and local expenditure (source)	1270.97	1344.55	1263.15
	(2030.16)	(2322.73)	(1996.51)
State and local expenditure (destination)	1276.77	1349.95	1268.99
	(2030.18)	(2322.33)	(1996.59)
Unemployment rate* (source)	0.06	0.06	0.05
	(0.01)	(0.01)	(0.01)
Unemployment rate* (destination)	0.06	0.06	0.06
	(0.01)	(0.01)	(0.01)
Gross state product (source)	99589.44	94307.26	100151.32
	(164105.70)	(175727.40)	(162821.84)
Gross state product (destination)	99336.07	94575.10	99842.51
	(164093.73)	(175679.60)	(162815.87)
Observations	9184	883	8301

Notes: Unweighted means, standard deviations in parentheses. The sample is college students aged under 30 who study in public school from Census year 1960 to 2000. Gross state product and state and local government expenditure is in millions of current dollars. The gross state product of the years before 1997 is based on the Standard Industrial Classification (SIC) and years after 1997 is based on the North American Industry Classification System (NAICS). 1960 gross state product is missind in the initial data and is predicted using Census data from 1960-2000.

*Unemployment rate is calculated using Census 1960-2000.

Source: Census 1960-2000& IPEDS 1980, 1984-2017& BLS 1976-2017& BEA 1962-2017.

Table 3: Effects of tuition gaps on college interstate migration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS regressions				IV regressions			
Tuition Gap*	0.04	0.04	-0.02	0.02	-0.49***	-0.40***	-0.36*	0.80
	(0.03)	(0.03)	(0.05)	(0.08)	(0.13)	(0.12)	(0.19)	(0.67)
R-squared (within)	0.03	0.05	0.13	0.62	0.03	0.04	0.12	0.58
Log gross state product (source&destination)	-	YES	YES	YES	-	YES	YES	YES
Log state&local expenditure (source&destination)	-	YES	YES	YES	-	YES	YES	YES
Unemployment rate (source&destination)	-	YES	YES	YES	-	YES	YES	YES
Source& destination state-specific trends?	-	-	YES	-	-	-	YES	-
Pair-specific trends?	-	-	-	YES	-	-	-	YES
P value: F-statistic of trends	-	-	0.00	0.00	-	-	0.00	0.00
Coefficient on reciprocity 1st stage					-0.36***	-0.39***	-0.26***	-0.17***
					(0.03)	(0.03)	(0.01)	(0.04)
Observations 1st stage					6285	6285	6285	6285
F-statistic 1st stage					1387	548	1800	3816
R-squared 1st stage (within)					0.66	0.70	0.89	0.92

Notes: The dependent variable is the log number of college students aged under 30 who study in public school from Census 1980-2000. The sample is college students migrating between pairwise states. 6285 observations. All regressions include year and state pair dummies. The instrument in columns 5-8 is reciprocity, a dummy for pairwise states having a reciprocity agreement with each other since agreement starting years. And the first stage uses census years.
*** p<0.01, ** p<0.05, * p<0.1

$$*TuitionGap_{sdt} = \begin{cases} log(resident\ tuition_{dt}) - log(resident\ tuition_{st}), & Reciprocity_{sdt} = 1 \\ log(nonresident\ tuition_{dt}) - log(resident\ tuition_{st}), & Reciprocity_{sdt} = 0 \end{cases}$$

Table 4: Effect of reciprocity agreements on college interstate migration

	(1)	(2)	(3)	(4)	(5)
Reciprocity	0.20***	0.20***	0.25***	0.07	0.10*
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
Observations	9184	9184	9184	9184	6285
R-squared (within)	0.39	0.42	0.47	0.68	0.13
Log gross state product (source&destination)	-	YES	YES	YES	YES
Log state&local expenditure (source&destination)	-	YES	YES	YES	YES
Unemployment rate* (source&destination)	-	YES	YES	YES	YES
Source& destination state-specific trends?	-	-	YES	-	YES
Pair-specific trends?	-	-	-	YES	-
P value: F-statistic of trends	-	-	0.00	0.00	0.00

*Notes: The dependent variable is the log number of college students migrating between pairwise states. The reduced form regressions on 9184 observations. The sample is college students aged under 30 who study in public school from Census year 1960-2000. Standard errors clustered by state pair in parentheses. All regressions include year and state pair dummies. The coefficients of controls are in the appendix. *** p<0.01, ** p<0.05, * p<0.1*

Source: Census 1960-2000& BLS 1976-2017& BEA 1962-2017.

Table A1: Effect of reciprocity agreements on college interstate migration

	(1)	(2)	(3)	(4)	(5)
Reciprocity	0.20***	0.20***	0.25***	0.07	0.10*
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
Log GSP (destination)		0.32***	0.25***	0.36***	0.63***
		(0.05)	(0.09)	(0.11)	(0.21)
Log GSP*dummy1997 (destination)		0.02	-0.11***	-0.12***	-0.09***
		(0.02)	(0.02)	(0.02)	(0.03)
Log GSP (source)		0.31***	-0.32***	-0.41***	-0.56**
		(0.05)	(0.08)	(0.11)	(0.22)
Log GSP*dummy1997 (source)		0.05***	-0.07***	-0.06***	-0.03
		(0.02)	(0.02)	(0.02)	(0.03)
Log state&local expenditure (destination)		0.29***	0.11*	0.10	0.35*
		(0.05)	(0.06)	(0.07)	(0.21)
Log state&local expenditure (source)		0.04	0.11**	0.11**	-0.47**
		(0.04)	(0.05)	(0.06)	(0.20)
Unemployment rate* (destination)		0.82	-0.17	0.30	-0.51
		(1.00)	(1.08)	(1.26)	(1.82)
Unemployment rate* (source)		2.93***	3.50***	2.91**	6.04***
		(0.95)	(1.09)	(1.29)	(1.81)
Observations	9184	9184	9184	9184	6285
R-squared (within)	0.39	0.42	0.47	0.68	0.13
Unemployment rate* (source&destination)	-	YES	YES	YES	YES
Source& destination state-specific trends?	-	-	YES	-	YES
Pair-specific trends?	-	-	-	YES	-
P value: F-statistic of trends	-	-	0.00	0.00	0.00

Notes: The dependent variable is the log number of college students migrating between pairwise states. The reduced form regressions on 9184 observations. The sample is college students aged under 30 who study in public school from census year 1960-2000. Standard errors clustered by state pair in parentheses. All regressions include year and state pair dummies. The 1960 gross state product is predicted using census years from 1970 to 2000. The coefficients of controls are in the appendix. *** p<0.01, ** p<0.05, * p<0.1
Source: Census 1960-2000& BLS 1976-2017& BEA 1962-2017.

Table A2: Effects of tuition gaps on college interstate migration

	(1)	(2)	(3)	(4)
	First stage using annual data			
Tuition Gap	-0.55***	-0.49***	-0.38*	0.43
	(0.14)	(0.14)	(0.20)	(0.33)
Log GSP (destination)		0.38***	0.75***	0.80***
		(0.09)	(0.20)	(0.26)
Log GSP*dummy1997 (destination)		-0.04***	-0.09***	-0.08**
		(0.02)	(0.03)	(0.04)
Log GSP (source)		-0.18*	-0.91***	-0.71**
		(0.10)	(0.24)	(0.34)
Log GSP*dummy1997 (source)		-0.03*	-0.02	-0.02
		(0.02)	(0.03)	(0.04)
Log state&local expenditure (destination)		0.15	0.28	0.22
		(0.12)	(0.21)	(0.26)
Log state&local expenditure (source)		0.27***	-0.33	-0.59**
		(0.09)	(0.21)	(0.29)
Unemployment rate (destination)		0.00	0.01	0.00
		(0.01)	(0.02)	(0.02)
Unemployment rate (source)		0.04***	0.03*	0.04*
		(0.01)	(0.02)	(0.02)
R-squared (within)	0.03	0.05	0.13	0.62
Log gross state product (source&destination)	-	YES	YES	YES
Log state&local expenditure (source&destination)	-	YES	YES	YES
Unemployment rate (source&destination)	-	YES	YES	YES
Source& destination state-specific trends?	-	-	YES	-
Pair-specific trends?	-	-	-	YES
P value: F-statistic of trends	-	-	0.00	0.00
Coefficient on reciprocity 1st stage	-0.33***	-0.32***	-0.25***	-0.31***
	(0.01)	(0.01)	(0.01)	(0.02)
Observations 1st stage	78,400	78,400	78,400	78,400
F-statistic 1st stage	326	312	2422	1.1E+13
R-squared 1st stage (within)	0.60	0.62	0.71	0.72

Notes: The dependent variable is the log number of college students migrating between pairwise states. The sample is college students aged under 30 who study in public school from census year 1980-2000. 6285 observations. Standard errors clustered by state pair in parentheses. All regressions include year and state pair dummies. The instrument in columns 6-15 is reciprocity, a dummy for pairwise states having a reciprocity agreement with each other since agreement starting years. *** p<0.01, ** p<0.05, * p<0.1
Source: Census 1960-2000& IPEDS 1980, 1984-2017& BLS 1976-2017& BEA 1962-2017.

Table A3: Effects of tuition gaps on college interstate migration (First stage)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First stage using census years				First stage using annual data			
Coefficient on reciprocity 1st stage	-0.36***	-0.39***	-0.26***	-0.17***	-0.32***	-0.31***	-0.25***	-0.31***
	(0.03)	(0.03)	(0.01)	(0.04)	(0.01)	(0.01)	(0.01)	(0.02)
Log GSP (destination)		0.21***	0.38***	0.40***		-0.04**	0.23***	0.22***
		(0.04)	(0.07)	(0.09)		(0.02)	(0.03)	(0.03)
Log GSP*dum1997 (destination)		0.00	0.01	0.01		0.01***	0.00	0.00
		(0.01)	(0.01)	(0.02)		(0.00)	(0.00)	(0.00)
Log GSP (source)		-0.70***	-0.39***	-0.37***		-0.37***	-0.53***	-0.53***
		(0.05)	(0.08)	(0.10)		(0.02)	(0.03)	(0.03)
Log GSP*dum1997 (source)		-0.07***	0.11***	0.11***		-0.05***	0.02***	0.02***
		(0.01)	(0.01)	(0.02)		(0.00)	(0.00)	(0.00)
Log state&local expenditure (destination)		-0.23***	0.40***	0.41***		-0.01	-0.14***	-0.15***
		(0.04)	(0.07)	(0.10)		(0.02)	(0.02)	(0.02)
Log state&local expenditure (source)		0.67***	-0.32***	-0.28**		0.22***	0.26***	0.26***
		(0.06)	(0.09)	(0.12)		(0.02)	(0.02)	(0.02)
Unemployment rate (destination)		0.00	0.01*	0.01		0.01***	0.01***	0.01***
		(0.01)	(0.01)	(0.01)		(0.00)	(0.00)	(0.00)
Unemployment rate (source)		-0.03***	0.03***	0.02***		-0.02***	-0.02***	-0.02***
		(0.01)	(0.01)	(0.01)		(0.00)	(0.00)	(0.00)
Observations 1st stage	6285	6285	6285	6285	81,500	81,500	81,500	81,500
R-squared (within)	0.66	0.70	0.89	0.92	0.59	0.62	0.70	0.71
Source& destination state-specific trends?	-	-	YES	-	-	-	YES	-
Pair-specific trends?	-	-	-	YES	-	-	-	YES
F-statistic 1st stage	1387	548	1800	3816	326	312	2422	1.1E+13

Notes: The dependent variable is the Tuition Gap. The sample is college students aged under 30 who study in public school from census year 1980-2000. Standard errors clustered by state pair in parentheses. All regressions include year and state pair dummies. The instrument is reciprocity, a dummy for pairwise states having a reciprocity agreement with each other since agreement starting years. *** p<0.01, ** p<0.05, * p<0.1

Source: Census 1980-2000& IPEDS 1980, 1984-2017& BLS 1976-2017& BEA 1962-2017.