

# The Role of Universities in Intergenerational Social Mobility: Examining Mobility at the Federal University of Pernambuco, Brazil

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2017

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# **The Role of Universities in Intergenerational Social Mobility: Examining Mobility at the Federal University of Pernambuco, Brazil**

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## **Abstract**

This paper analyzes social mobility as realized by students of a high quality public flagship university in Brazil, the Federal University of Pernambuco (UFPE), applying the methodology of Chetty et al. 2017 in the paper "Mobility Report Cards: The Role of Colleges in Intergenerational Mobility". Intergenerational income mobility is analyzed using the family income of students matriculating to the university in 2005-2006 and individual earnings 8-9 years later. Upward mobility is defined as the percentage of students who attain the highest quintile of individual earnings among those who matriculated from the lowest income families. The mobility index for UFPE is compared to public flagship and private universities in the United States as calculated by Chetty et al. (2017). While these are non-causal estimates they nonetheless suggest that public universities can play a key role in facilitating upward social mobility in Brazil.

**Key words:** Intergenerational Income Mobility, Tertiary Schooling, Brazil

**JEL code:** D31, I24, I23

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<sup>1</sup> Inter-American Development Bank

<sup>2</sup> Federal University of Pernambuco

## Abbreviations and Acronyms

|        |   |
|--------|---|
| COVEST | Comissão de Concursos e Vestibulares/Admission and Examination Commission                                     |
| ENEM   | Exame Nacional do Ensino Médio/National High School Exam  |
| FIES   | Fundo de Financiamento Estudantil/Student Financing Fund  |
| IBGE   | Instituto Brasileiro de Geografia e Estatística/Brazilian Institute of Geography and Statistics               |
| INEP   | Instituto Nacional de Estudos e Pesquisas Educacionais/National Institute of Educational Studies and Research |
| LAC    | Latin America and the Caribbean   |
| PNAD   | Pesquisa Nacional por Amostra de Domicílios/National Household Survey Sample                                  |
| PROUNI | Programa Universidade para Todos/University for All Program   |
| RAIS   | Relação Anual de Informações Sociais/Yearly Social Information Report   |
| UFPE   | Universidade Federal de Pernambuco/Federal University of Pernambuco   |
| U.S.   | United States of America  |

## 1. Introduction

The practice of not charging tuition or fees at high quality public universities in Latin America has long been criticized as a policy with good intentions that effectively acts as a subsidy from the poor to the rich. The regressive nature of government investment in tertiary schooling compared with spending at lower levels of schooling has been highlighted for decades. (Psacharopoulos et al., 1986, Rozada et al. 2002, Busso et al. 2017). In Brazil, the tuition-free Federal universities were for many years regarded as institutions that served the elite, as the poor were understood to be excluded by entrance exams that were insurmountable without previous private schooling and expensive tutoring (Birdsall and James 1993). Using administrative data for incoming students, we explore patterns of intergenerational mobility by comparing the family income at the time of matriculation with later young adult earnings. Our analysis explores whether mobility at UFPE, as measured for cohorts matriculating in 2005-2006, aligns with the conventional perception of little mobility at elite public flagship universities<sup>3</sup> or whether the observed mobility is more aligned with that measured in U.S. universities by Chetty et al. 2017.

## 2. Background

Our primary unit of analysis is students applying to the Federal University of Pernambuco in Brazil (Universidade Federal de Pernambuco, UFPE). UFPE is the major flagship university in the northeast of Brazil and one of the top ten institutions in the country, according to the Ministry of Education. In addition to its high quality and reputation, it is a public university and does not charge tuition. These features make it a very attractive choice for high school applicants from the state of Pernambuco, regardless of their future career choices or socioeconomic background. As of 2016, enrollment at all university campus includes 30,000 undergraduate and 13,000 graduate students, with an average of 5,000 undergraduate students admitted per year over the period of analysis 2005-2006.

Despite the broad-based applicant pool at UFPE, the students admitted to the University represent a particular subsection of the cohort of students that each year are admitted into Brazilian universities. In that sense, and to provide some context to how UFPE compares to the rest of the country, in Table 1 we compare Exame Nacional do Ensino Médio (ENEM) scores for entrants of the University with general scores from students entering college in Pernambuco and Brazil in the year 2006 (MEC, 2006). The ENEM is a standardized, non-mandatory Brazilian national exam for high school students in Brazil and is mostly used as one of the admission criteria for being accepted into tertiary education. UFPE matriculants perform better than the national and state averages for entrants in Universities across the country.

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<sup>3</sup> The cohorts under consideration predate the 2012 Federal policy in which Brazil began implementing policies at federal universities to expand access to traditionally excluded students.

**Table 1. Standardized High School (ENEM) scores and mother's education**

|                   | ENEM score (0-100) | Mother's education (% any tertiary education) |
|-------------------|--------------------|---|
| UFPE matriculants | 46.35              | 37.7  |
| Pernambuco        | 43.53              | 14.17 <sup>1</sup>                            |
| Brazil            | 44.49              | 23.51   |

<sup>1</sup>. Refers to the entire Northeast region

The same pattern is observed when the focus is on family educational background. For UFPE students, we use mother's tertiary education level as reported by the 2004 matriculants. At the national and regional level, we draw from a 2005 Instituto Nacional de Estudos e Pesquisas Educacionais (INEP) study of ENEM participants – a proxy for individuals applying to University that year (INEP, 2006). The report focuses on the socioeconomic profile of ENEM participants and reports on mother's education level. Analogous to the pattern seen with ENEM scores, UFPE students report themselves as coming from a more advantageous educational background than their regional or national peers.

### 3. Data

Table 2 summarizes the differences in the data sources for the UFPE analysis and the analysis of U.S. universities by Chetty et al. (2017). The family income for students matriculating at UFPE is taken from an administrative data set, the Commission of the Vestibular Exam of UFPE or Comissão de Concursos e Vestibulares (COVEST). During 2005-2006 9,513 matriculants entered the university, with their family income reported at the time they took the entry exam to the university. The income of the family is not reported continuously but in categories. As such, as shown in Figure 1, it is not possible to create the exact categories to replicate the bottom income quintile. The bracket of family income is assigned a percentile according to the national household income distribution as measured in the 2005 and 2006 Pesquisa Nacional por Amostra de Domicílios (National Household Survey Sample - PNAD) (IBGE, 2017). While we do not have an external means of validating the self-reported parental income from the COVEST, we note that there is a high correspondence between the lowest income category and low parental education. Of the entrants in 2005-2006 reporting the lowest family income category, 38.4% reported the schooling attainment of the mother was less than primary complete. Of the matriculants reporting higher family incomes, the schooling attainment of the mother was less than primary complete for 28.1% of this group.

The U.S. analysis relies heavily on tax records in which students attending accredited U.S. colleges are matched by social security numbers across tax forms in which the students have been listed as dependents, typically by parent(s). The U.S. sample is comprised of 6.7 million

students ages 19-22 who attended 2,199 accredited universities in 1999-2004. Parental income for this sample reflects the average of when the college student was age 15-19 in 1996-2000 to smooth transitory fluctuations. The family income is ranked relative to all other families in the national distribution who have children in the same birth cohort.

The individual earnings data for the same sample of students who entered UFPE in 2005-2006 in Brazil are measured 8-9 years later using an administrative database, the *Relação Anual de Informações Sociais* (RAIS), that is also linked to the tax system with approximately 49.6 million records for individuals in 2014.<sup>4</sup> The RAIS is a longitudinal data-set at the employee-employer level, with national coverage of the Brazilian formal labor market. We match 85% of students, both for male and for females, from the enrollment data in the 2005-2006 to the 2014 RAIS.

The young adult earnings for the sample of U.S. college students is also taken from tax records as reported in 2014 for wage earnings and net self-employment income. An individual's percentile in the earnings is based on the national distribution of individual earnings for others in the same birth cohort.

Some key differences in the data should be highlighted. The narrower lowest income bracket in Brazil, covering students from the lowest 8% rather than the lowest 20% of family incomes, serves to underestimate the measure of upward mobility in UFPE relative to the measures at universities in the U.S. The coverage of earners into taxable earnings, while high in both cases, is likely to be different for the U.S. and Brazil and may influence the results as well.

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<sup>4</sup> RAIS or Yearly Social Information Report, is a large restricted-access Federal data set collected by the Brazilian Ministry of Labor. Every year, tax registered firms are legally required to report every worker formally employed at some point during the previous calendar year. This is a longitudinal data-set at the employee-employer level, with national coverage of the Brazilian formal labor market from 2006 to 2014.

**Table 2. Differences in Samples for Mobility and Persistence Analysis**

|  | US  | Brazil   |
|--|---|--|
| <b>Initial Sample</b>  | 6.7 million students attending 2,199 universities (1190 public and 1009 private)  | 9,513 students attending 1 Federal public university in the state of Pernambuco during 2005-2006   |
| <b>Ages at baseline</b>                                      | Ages 19-22 in 1999-2004 as students   | Ages 20-21 in 2005-2006 as students  |
| <b>Ages at followup</b>                                      | Ages 32-34 in 2014 (may or may not have graduated)  | Ages 28-29 in 2014 (may or may not have graduated)   |
| <b>Parental Income</b>                                       | Parental income reflects the average of when college student was age 15-19 in 1996-2000 to smooth transitory fluctuations. The parental income is ranked relative to all other parents in national distribution who have children in the same birth cohort. Matching of student and parental tax records as described in Chetty et al 2017. | Family income is self-reported by students in 2005-2006 from entry level administrative surveys at university. Percentiles assigned by using income cutoffs for national ranking of family income in 2005 and 2006 PNAD.   |
| <b>Young adult earnings</b>                                  | Baseline sample's tax records as reported in 2014 for wage earnings and net self-employment income. Percentiles assigned by ranking individual earnings relative to all other in same birth cohort.   | Individual earnings: federal tax related data from the ministry of labor (RAIS - Relação Anual de Informações Sociais or Yearly Social Information Report). Percentiles assigned by using earnings cutoffs for national ranking of individual earnings for individuals 28-29 in 2014 PNAD. |
| <b>Mobility</b>  | transition from lowest 20% of parent income to highest 20% of individual earnings   | transition from lowest 8% of family income to highest 20% of individual earnings   |
| <b>Persistence</b>   | transition from highest 20% of parent income to highest 20% of individual earnings  | transition from highest 20% of family income to highest 20% of individual earnings   |
| <b>Distance in years (from attendance to adult earnings)</b> | 10-13 years   | 8-9 years  |
| <b>Excluded from the sample</b>                              | Analysis excludes foreign students, students who were never declared as dependents in tax returns and students whose parents declare negative income in their tax returns.  | Individual earnings only includes formal sector (85% coverage) for this sample.  |

While the analysis for UFPE is not perfectly comparable to Chetty's analysis of universities in the U.S, it nonetheless permits us to assess whether the observed social mobility better aligns with traditional perception of public flagship universities in Latin America (little to no mobility) or perceptions of universities in the U.S. (considerable mobility).

#### 4. Methodology

To compare with Chetty et al. 2017, we define upward mobility as the percentage of students who matriculate to the university in a low-income bracket according to the national distribution of family income, and subsequently attain as young adults the highest quintile of earnings, again measured relative to their peers in the national distribution of earnings. We also measure the persistence of intergenerational income associated with universities by measuring the percentage of students

matriculating in the highest family income quintile who maintain the highest income quintile bracket of earnings as young adults. It is important to clarify that the methodology applied does not identify the causal effects on students of attending a university, but rather is a descriptive analysis of the intergenerational mobility associated with the universities.

Following Chetty et al. 2017 we calculate an index that estimates the effectiveness of the university at social mobility which depends on the mobility rate as well as the university's coverage of the poor students. Whereas the transition mobility measures the effectiveness on upward mobility from the perspective of a low-income individual, the college mobility index assesses the overall mobility of low income students realized by the university. If the policymaker's objective is to maximize the chance of a low-income matriculant reaching the highest earnings bracket the transition mobility is most relevant. But if the policymaker is interested in lifting the trajectory of low-income students to the top earnings brackets, the university index is more relevant. A similar index is compiled to measure the persistence associated with specific colleges. To calculate the index of college persistence the transition persistence is multiplied by the coverage of students from the highest income bracket.

## 5. Results

While the analysis for Brazil is neither comprehensive nor fully comparable to Chetty's analysis of universities in the U.S, it nonetheless permits us to assess whether the social mobility observed at UFPE is aligned with common perceptions. Not surprisingly, at UFPE as well as among the U.S. universities, as can be seen in Tables 3 and 4, the measure of persistence, or the probability of attaining the highest quintile of earnings as young adults given that one matriculated in the highest income quintile, is higher than mobility, or the probability of transitioning from the lowest to highest income bracket.<sup>5</sup> The higher success rates in reaching the highest earning brackets for students matriculating from the highest income brackets does not contrast with the conventional wisdom regarding the trajectory of the most advantaged.

However contrary to the conventional wisdom, as can be seen in Table 4, UFPE is associated with considerable intergenerational upward mobility. The observed mobility at Brazil's flagship public university UFPE (42.6%) is similar to mobility rates at the U.S. public flagship universities, (33.9% on average).<sup>6</sup> The university's overall effectiveness observed in promoting social mobility depends on the coverage of low income students. UFPE's coverage of low income students, despite capturing the poorest 8% rather than poorest 20%, is higher than that at U.S. Ivy-plus institutions and U.S. public flagships. The overall social mobility index for UFPE (2.8%) is above Stanford, Yale and Harvard and at the top of the range of the U.S. public flagships.<sup>7</sup> In this sense,

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<sup>5</sup> We should keep in mind that the comparisons are similar but not equivalent across countries.

<sup>6</sup> Chetty et. al define public flagships using the College Board Annual Survey of Colleges (2016). There are 31 U.S. flagships included in the average.

<sup>7</sup> Again, we are likely underestimating mobility in the case of Brazil.

the public flagship of UFPE can be described as on the path to being an “engine of social mobility”, as Chetty describes the U.S. public flagships with the highest indices of mobility.

It is important to note that while we have documented considerable mobility from lowest to highest income brackets at UFPE, these transitions are not realized by all students in the sample and as noted in other research in the region, some students may encounter downward mobility and/or negative private returns on their investments in tertiary education. The tremendous expansion in tertiary schooling has placed downward pressure on the returns to completing tertiary as compared with secondary. Not only have returns to completing tertiary versus secondary declined in recent years (Busso et al 2017), but studies find that the private return to graduating from college is negative for approximately 30% of students in Colombia and 20% of students in Chile (Gonzalez-Velosa et al. 2015).<sup>8</sup> Moreover, studies have found declines in the overall quality of tertiary schooling provided as compared with earlier years (Busso et al 2017).

## 6. Policy Implications

The persistence of economic advantage as passed from one generation to another is observed in both the U.S. universities as well as UFPE, where college students matriculating from high income backgrounds are one-third to two-thirds more likely to reach the upper rungs of young adult earnings than peers from low income backgrounds. Conventional perception has held that universities in Latin America, particularly flagship public universities, did not offer a ladder for low-income students to attain the highest rungs of earnings as young adults. The analysis demonstrates that for cohorts entering between 2005-2006, the Federal University of Pernambuco (UFPE) provided more mobility than the average for U.S. flagship public universities as well as a higher index of mobility than numerous elite private universities. While these are non-causal estimates they nonetheless suggest that public universities can play a key role in facilitating upward social mobility in Brazil.

The improvement in access to tertiary schooling in Latin America is both a reflection of the continued improvements in the graduation rates of secondary school among the lowest income quintiles, but also to the availability of programs enacted in LAC to expand access to less advantaged students. To expand access to lower income students at private universities in Brazil, the government provides both loans and scholarship programs (FIES and PROUNI), although these programs have recently experienced budget cuts. In 2012 federal universities in Brazil began implementing a federal policy aimed to expand access to traditionally excluded students, by guaranteeing 50% of entrance places for public school students with half of those spots reserved for low-income students and a share by ethnicity and race according to the demographic composition of the state.<sup>9</sup> The effect of these policies on increasing social mobility

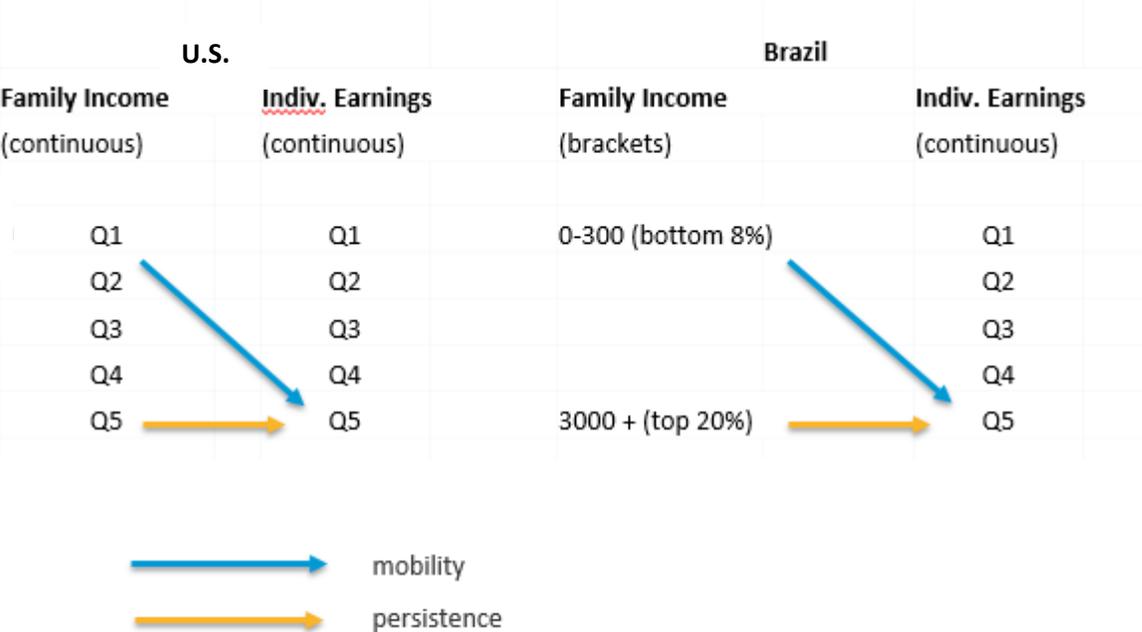
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<sup>8</sup> Private returns take into consideration the costs, including opportunity costs, of additional education not only the difference in earnings between different levels of schooling.

<sup>9</sup> The analysis for UFPE includes cohorts that entered before the policy was implemented at UFPE.

is still in an early stage but is beginning to be assessed.<sup>10</sup> If education quality is maintained, the expanded access will further activate universities to be key drivers of social mobility. With respect to the long-term research agenda efforts have begun to focus on the causal effects of attending specific universities to be able to address the central question of attribution. A closer look at the role of tertiary schooling in promoting social mobility is warranted.

**Figure 1. Intergenerational Income Mobility and Persistence, U.S. and Brazil**



<sup>10</sup> The Federal Policy is an extension of earlier policy initiatives that began with the 2002 affirmative action policy at the State University of Rio de Janeiro and spread in non-uniform ways to approximately 49 higher education institutions by 2010.

**Table 3. Intergenerational Income Persistence by University: Brazil, U.S.**

|  | <b>Persistence:<br/>% from top<br/>income<br/>bracket<br/>attaining top<br/>earnings<br/>bracket</b> | <b>Coverage:<br/>% enrolled<br/>from top<br/>income<br/>bracket</b> | <b>Index of<br/>Univ.<br/>Persistence<br/>(1X2)</b> |
|--|--|---|---|
| <b>Brazil</b>                                      |  |   |   |
| Federal University of Pernambuco                   | 71.6   | 36.2  | 25.9  |
| <b>United States</b>                               |  |   |   |
| Top 5 Public Universities Ranked by Index          | 30.8   | 26.1  | 8.0   |
| University of Virginia                             | 64.5   | 68.4  | 44.1  |
| Univ. of Michigan - Ann Arbor                      | 62.4   | 68.9  | 43.0  |
| Georgia Institute of Tech.                         | 71.7   | 58.6  | 42.0  |
| College of William & Mary                          | 56.5   | 69.8  | 39.5  |
| California Maritime Academy                        | 76.7   | 50.6  | 38.8  |
| Average of Public Universities                     | 27.6   | 20.7  | 5.7   |
| Top 5 Public Flagship Universities Ranked by Index |  |   |   |
| University of Virginia                             | 64.5   | 68.4  | 44.1  |
| Univ. of Michigan - Ann Arbor                      | 62.4   | 68.9  | 43.0  |
| University of Delaware                             | 55.8   | 62.6  | 34.9  |
| Univ. of California, Berkeley                      | 62.1   | 51.3  | 31.9  |
| Univ. of North Carolina - Chapel Hill              | 53.6   | 59.4  | 31.8  |
| Average of Public Flagship Universities            | 47.9   | 46.7  | 22.4  |
| Top 5 Private Universities Ranked by Index         |  |   |   |
| Princeton University                               | 70.6   | 76.8  | 54.2  |
| Washington And Lee University                      | 64.7   | 81.3  | 52.6  |
| Georgetown University                              | 70.8   | 72.7  | 51.5  |
| Duke University                                    | 70.9   | 71.7  | 50.8  |
| University of Pennsylvania                         | 71.3   | 69.9  | 49.9  |
| Top 5 Ivy League Plus Universities Ranked by Index |  |   |   |
| Princeton University                               | 70.6   | 76.8  | 54.2  |
| Duke University                                    | 70.9   | 71.7  | 50.8  |
| University of Pennsylvania                         | 71.3   | 69.9  | 49.9  |
| Stanford University                                | 69.5   | 69.0  | 48.0  |
| Yale University                                    | 64.6   | 73.2  | 47.3  |
| Average of Private Universities                    | 34.6   | 32.4  | 11.2  |

Notes: Results for the United States come from Chetty et al. 2017. Ivy-Plus colleges are defined as the Ivy League plus Stanford, MIT, Chicago, and Duke and public flagships are defined using the College Board Annual Survey of Colleges (2016).

**Table 4. Upward Intergenerational Mobility by University: Brazil, U.S.**

|  | <b>Mobility: %<br/>from lowest<br/>income bracket<br/>attaining top<br/>earnings<br/>bracket</b> | <b>Coverage:<br/>% enrolled<br/>from lowest<br/>income<br/>bracket</b> | <b>Index of<br/>Univ.<br/>Mobility<br/>(1x2)</b> |
|--|--|--|--|
| <b>Brazil</b>                                      |  |  |  |
| Federal University of Pernambuco                   | 42.6 †   | 6.6  | 2.8  |
| <b>United States</b>                               | 19.6   | 12.5   | 2.5  |
| Top 5 Public Universities Ranked by Index          |  |  |  |
| CUNY Bernard M. Baruch                             | 46.8   | 27.6   | 12.9   |
| CUNY City College of New York                      | 36.0   | 32.5   | 11.7   |
| CUNY Lehman College                                | 27.9   | 36.7   | 10.2   |
| California State University, Los Angeles           | 29.9   | 33.1   | 9.9  |
| CUNY John Jay College of Criminal Justice          | 35.7   | 27.2   | 9.7  |
| Average of Public Universities                     | 15.8   | 14.5   | 2.3  |
| Top 5 Public Flagship Universities Ranked by Index |  |  |  |
| University of California, Berkeley                 | 55.2   | 8.8  | 4.9  |
| Rutgers, State University of New Jersey            | 47.3   | 7.9  | 3.7  |
| State University of New York, Buffalo              | 42.5   | 8.2  | 3.5  |
| University of Florida                              | 42.8   | 6.1  | 2.6  |
| University of Washington System                    | 45.6   | 5.4  | 2.5  |
| Average of Public Flagship Universities            | 33.9   | 5.4  | 1.8  |
| Top 5 Private Universities Ranked by Index         |  |  |  |
| Vaughn College of Aeronautics and Tech.            | 44.8   | 36.5   | 16.4   |
| Mass. Coll. Pharm. and Health Sciences             | 91.3   | 10.2   | 9.3  |
| Pace University                                    | 55.6   | 15.2   | 8.4  |
| ITI Technical College                              | 40.2   | 20.3   | 8.1  |
| Technical Career Institutes                        | 19.8   | 40.3   | 8.0  |
| Top 5 Ivy League Plus Universities Ranked by Index |  |  |  |
| Massachusetts Institute of Technology              | 66.5   | 5.1  | 3.4  |
| Columbia University                                | 61.2   | 5.0  | 3.1  |
| Cornell University                                 | 59.4   | 4.9  | 2.9  |
| Stanford University                                | 62.7   | 3.6  | 2.2  |
| Yale University                                    | 57.3   | 3.6  | 2.1  |
| Average of Private Universities                    | 24.0   | 10.2   | 2.4  |

Notes: † In the case of UFPE (Brazil) the lowest income bracket for access is the poorest 8% of families from the national income distribution. Results for the United States come from Chetty et al. 2017. Ivy-Plus colleges are defined as the Ivy League plus Stanford, MIT, Chicago, and Duke and public flagships are defined using the College Board Annual Survey of Colleges (2016).

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