

LIMITED UPWARDS MOBILITY AMONG LATINOS IN ARIZONA: EXPLORATORY ANALYSIS OF DRIVERS USING PUMS MICRODATA



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1 Introduction

This manuscript serves as a continuation of the study **Latinos in Arizona: a GAP analysis of PUMS microdata**. While the previous work offered a broad descriptive analysis of overarching trends observed in the dataset, the current study delves deeper into identifying the key factors influencing limited upward social mobility among Latinos. We employ a holistic approach, considering educational attainment, employment, and financial stability as interconnected components. Our investigation begins with a focus on educational investments.

Initially, we assess the existence of disparities in educational attainment by calculating the probability that an individual has earned a high-level educational degree, while accounting for pre-existing characteristics. This analysis indicates that Latinos are 11 to 19 percentage points less likely to obtain these degrees compared to their counterparts.

To understand the practical implications of these educational disparities, we evaluate a wage-education model that adjusts for various confounding variables. Our findings reveal substantial and statistically significant economic benefits of education. For example, within the 21 to 30-year-old demographic, obtaining a bachelor's degree correlates with a 42% increase in annual income when compared to earning only a high school diploma.

To underscore the pivotal role of education, we refine our wage-education model by incorporating markers for Hispanic ethnicity, analyzing the data both with and without adjustments for educational attainment levels. When educational achievement is not accounted for, we observe significant negative effects associated with Hispanic identity on wages. However, these adverse effects diminish and frequently turn statistically insignificant once we control for educational attainment. This observation leads us to conclude that inadequate educational attainment is a primary, if not the most critical, underlying factor contributing to constrained wage earnings among members of this cohort.

After confirming the presence of educational disparities and their role in perpetuating income inequality within this group, our next step is to investigate the drivers behind these gaps. Potential factors to examine include diminished returns on education for Latinos, elevated costs of financing or opportunity costs, and inaccurate expectations of future returns.

Lower returns on education for Latinos may stem from several sources: either the quality of higher education they receive is comparatively lower, Latinos tend to choose fields of study linked with more modest income growth, or worse educational backgrounds limit the benefit of subsequent instruction. Elevated costs for Latinos could be due to higher interest rates on loans or scarce financial resources, compelling them to finance a greater portion of their education. Additional factors contributing to increased educational expenses include significant opportunity costs—such as foregoing current employment or the need to provide for dependents who would otherwise require paid care. Furthermore, it is possible that Latinos might undervalue the financial benefits of a college degree, leading to a rational decision to under-invest. This particular concern could be addressed through careful survey design.

We refine our wage model to allow variations in educational returns based on Latino origin, gender, and the interaction of Latino origin and gender. The findings from this analysis confirm that individuals from this demographic experience diminished returns on their educational investments in comparison to their peers. However, the scale of these reduced returns is relatively minor when contrasted with the potential gains previously identified. Although we cannot definitively rule out the impact of these lesser returns on the insufficient educational investment observed among this group without first evaluating the financing costs they encounter, our preliminary assessment suggests that these reduced returns are not the principal factor behind the educational disparities observed.

The PUMS dataset’s limitations prevent us from examining the impact of specific majors or minors on future earnings. Consequently, this aspect of educational choice and its effect on wage outcomes remains unexplored in our current study. Additionally, the dataset does not provide a means to evaluate the influence of the quality of prior education received. Given the intricate nature of these factors, we plan to defer the investigation of how family structure and the presence of dependents may affect decisions regarding educational investment to future analysis.

2 How Large are gaps in education for Latinos?

Our previous research has highlighted that, on average, Latinos have lower levels of educational attainment compared to their non-Latino peers. However, that analysis was primarily descriptive and did not adjust for potential confounding variables like nationality, gender, disability, and others. Neglecting such factors can skew our results if they are related to both Latino ethnicity and the likelihood of completing education, a scenario that appears reasonable. For example, nationality is closely tied to ethnic background, with Latino identity often associated with being born in Latin America. This, in turn, likely increases the costs of completing higher education through numerous channels, including having previous attainment not validated in the US.

To bridge this gap, we first estimate a logistic regression model of the likelihood of having completed college or more, among those not currently pursuing education, as a function of Latino ethnicity, disability status, age, region of birth, and sex. The model is fitted separately by age cohort. Even number columns include controls with PUMA of residence, which we hope proxy for unmeasured individual ability - an omitted variable that has received considerable attention by economists studying education.

In Table 1, we find that being born in Latin America is associated with significantly lower rates of completion, as does being a non citizen. These effects may be capturing language barriers, or the lack of safety nets that can help offset the costs of education, among many possible channels. Second, we observe statistically significant higher rates of completion among females. Interestingly, the Hispanic and female interaction term is not statistically significant, implying that the male-female gap is similar for Hispanics and non-Hispanics. Most importantly, however, is that in all specifications Hispanic ethnicity is associated with lower rates of completion.

Note that table 1 only reports estimates of a non-linear model. Table 2 computes

average marginal effects separately for female and Hispanic indicators. Controlling for the previously mentioned confounding factors, Hispanics complete higher education anywhere from 11 to 19% less often. Females experience higher rates of completion to the tune of 1 to 7%. Female effects tend to be one fourth to one half the magnitude of Hispanic effects, implying that Latinas are unlikely to overcome the in-group lower rates of completion.

3 What's the return to education in Arizona?

The previous section established that Latinos complete higher education at lower rates than their peers, even after accounting for some confounding effects. Ultimately, the primary goal of this project is to identify factors that limit the socio-economic mobility of this cohort. Higher income is the most important roadblock to reach the middle class. In this section we study how educational attainment transforms the income outlook of un-enrolled Arizonan individuals who earn a salary.

Table 3 shows coefficient estimates of a log-linear model of inflation-adjusted income as a function of sex, region of birth, citizenship, disability, and education. We find that disability is associated with substantial reductions in earnings to the tune of 30 to 40% of annual income. Notably, the coefficient of Latin America is only negative and statistically significant in some specifications that include older cohorts. Thus, we find limited evidence of labor market discrimination against Latinos in Arizona. Being a non-citizen is, however, associated with substantially lower earnings, anywhere from 7 to 20%. In addition to proxying for unobserved characteristics such as language barriers, citizenship is also indicative of barriers to legal employment, barring being a permanent resident. Thus, it's not surprising that this coefficient is significantly negative. Relative to our base category, "less than 12th grade", we find that subsequent educational attainment leads to robust increases in income. These effects are monotonic: each additional degree is not only associated with higher earnings relative to the base category, but also to the next lower attainment level. Earning a BA degree, for instance, is associated with 66 to 86% higher income compared to the base category, whereas a graduate degree will on average lead to 89 to 115% increases. Last, the coefficient for female is negative and statistically significant. This coefficient will capture any potential labor market discrimination, individual preference for jobs, and part-time work.

4 Do Latinos really earn lower wages?

Table 4 takes the basic return-to-education model discussed previously and includes as an independent variable Hispanic ethnicity, as well as an interaction with female. The purpose of this exercise is to compare wage salary with and without controlling for education.

Among those under 40 we measure Latino wage gaps only when we fail to control for educational attainment. Once controlled for, the average marginal effect of being Latino on wage income becomes statistically insignificant. For those 41 to 60 we continue to measure a wage gap, even after controlling for attainment. This gap,

however, decreases by a factor of 2 to 4 to 5% among those 41-50 and 9.4% among those 51-60. Thus, if labor market discrimination among Latinos does indeed exist, it is likely affecting older generations.

In contrast, we continue measuring wage gaps among females to the tune of 20 to 40%. These gaps continue even after controlling for educational attainment, and, in fact, increase. The same caveats as before hold true: we do not control for industry, position, or hours worked, among many possible confounding factors.

5 Are Latinos compensated less for investing in education?

We study this question in tables 5 and 6, where we report point estimates and average marginal effects, respectively. The models estimated in this section are richer than those in the previous section. We allow Latino individuals to receive different returns to education for each possible bracket that we consider, by interacting Hispanic identifier with education. Furthermore, we aim to reduce unobserved heterogeneity by controlling for 2-digit NAICS industry in odd-number columns.

Overall, we tend to find economically important and statistically significant negative education-by-Latino interaction terms, which suggest that Latinos' wages increase less than their peers with additional educational attainment. To illustrate, a 21-30 year old Latino with a BA degree is predicted to earn $-21.3\% + 19.8\% = -1.5\%$ compared to their peers. Part of the reason that this lower differential return didn't translate into evidence of labor market discrimination initially is that Latinos lag substantially in terms of attainment (i.e., the extensive margin). The point estimates reported here, while large and significant, are calculated on a minority of individuals who have limited influence on the total effects reported in table 6, especially for advanced educational degrees.

6 Concluding remarks

The present analysis documents the large gaps that Latinos in Arizona experience in terms of educational attainment. These gaps are critical, as education is associated with substantial increases in wage income, a critical component of socio-economic mobility.

While Latinos earn significantly lower wages, we find that most of these differences are explained by lower educational attainment. Thus, the "Latino wage gap" is more accurately described as a "Latino educational gap". Latinos experience lower education-dependent increases in salary both in the extensive margin (i.e., lower attainment), as well as in the intensive margin (i.e., lower salary increases for a given educational degree). However, the intensive margin effects are relatively modest, which implies that the differences in wages that we observe are mostly a function of the extensive margin.

This analysis does not claim that the results reported here are necessarily **causal**, as there are many unobserved characteristics that may bias our results. The most commonly discussed example in economics is latent ability. Ability has both an

independent positive effect on wages, as well as an indirect effect on wages through educational attainment (individuals with higher ability are more likely to complete educational degrees). This mechanism leads to a higher probability of seeing high ability individuals with advanced educational degrees. Hence, the pool of individuals with and without educational degrees that we observe differ not only in terms of attainment, but also in terms of ability, which has an independent effect on wages. As such, the results discussed here fall short of a counterfactual: if we took every Latino and put them through college, their annual salaries would not rise by 86.2% among the 31 to 40 year-old cohort, as table 3 would seem to imply. Rather, these numbers should be interpreted as an upper bound and a guide to the true contribution of education.

In summary, Latinos exhibit rates of educational attainment that are at odds with the high measured returns. Increasing completion rates would most likely contribute to reduce labor income wage gaps to a great extent, which would increase socio-economic mobility both through higher disposable income, as well as through subsequent accumulation of wealth.

7 Tables

Table 1: Logit estimates of the likelihood of obtaining a HED

	21-30	31-40		41-50		51-60	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	No FE	FE	No FE	FE	No FE	FE	No FE
College degree or more							
Latin America	-0.283* (-2.04)	-0.0870 (-0.60)	-0.597*** (-5.26)	-0.449*** (-3.93)	-0.443*** (-5.23)	-0.354*** (-4.16)	-0.303*** (-3.54)
Non Citizen=1	-0.255 (-1.94)	-0.355** (-2.58)	-0.0570 (-0.58)	-0.113 (-1.13)	-0.578*** (-7.43)	-0.491*** (-6.12)	-0.725*** (-8.33)
Hispanic	-1.016*** (-15.08)	-0.805*** (-11.47)	-0.904*** (-14.93)	-0.754*** (-12.10)	-1.011*** (-15.80)	-0.816*** (-12.23)	-1.006*** (-14.49)
Female=1	0.421*** (9.89)	0.440*** (9.89)	0.290*** (8.22)	0.301*** (8.11)	0.201*** (5.85)	0.201*** (5.55)	0.0292 (0.93)
Hispanic $\times$ Female=1	0.100 (1.15)	0.0838 (0.93)	-0.0412 (-0.53)	-0.0355 (-0.44)	0.0484 (0.62)	0.0356 (0.44)	0.0939 (1.08)
Observations	31735	31735	36910	36910	36663	36663	42507

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: includes controls for age and disability. Columns 2, 4, 6, and 8 include PUMA locality fixed effects.

Table 2: Average marginal effects of Latino origin and sex on the likelihood of obtaining a HED

	21-30		31-40		41-50		51-60	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	No FE	FE	No FE	FE	No FE	FE	No FE	FE
Hispanic	-0.151*** (-22.75)	-0.111*** (-15.94)	-0.181*** (-22.84)	-0.142*** (-17.39)	-0.188*** (-22.18)	-0.143*** (-16.34)	-0.169*** (-21.26)	-0.140*** (-17.14)
Female=1	0.0734*** (12.10)	0.0688*** (11.97)	0.0560*** (8.86)	0.0538*** (8.81)	0.0419*** (6.84)	0.0380*** (6.46)	0.00842 (1.49)	0.00727 (1.34)
Observations	31735	31735	36910	36910	36663	36663	42507	42507

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: average marginal effects estimated from baseline regression model (see table 1). Omitted categories are male and non-Hispanic. Columns 2, 4, 6, and 8 include PUMA locality fixed effects. Standard errors calculated with the Delta method.

Table 3: Labor market returns to education

	(1)	(2)	(3)	(4)
	21-30	31-40	41-50	51-60
Any disability=1	-0.317*** (-8.10)	-0.463*** (-9.22)	-0.409*** (-10.84)	-0.360*** (-11.52)
Latin America	0.00631 (0.13)	-0.0341 (-1.01)	-0.0895** (-3.19)	-0.128*** (-4.36)
Non Citizen=1	-0.0726 (-1.37)	-0.0735 (-1.80)	-0.150*** (-4.92)	-0.190*** (-5.38)
12th grade, no diploma	0.0345 (0.58)	0.0523 (0.98)	0.0227 (0.46)	0.173*** (3.42)
HS diploma	0.174*** (4.81)	0.236*** (6.67)	0.138*** (4.61)	0.230*** (6.92)
Some college	0.299*** (8.07)	0.417*** (11.41)	0.308*** (9.85)	0.369*** (10.54)
Associate's degree	0.400*** (9.03)	0.555*** (14.18)	0.416*** (11.56)	0.462*** (11.96)
BA degree	0.663*** (17.88)	0.862*** (24.32)	0.735*** (23.07)	0.780*** (21.78)
Graduate degree	0.889*** (20.85)	1.151*** (31.31)	1.025*** (33.00)	1.030*** (27.45)
Female=1	-0.265*** (-17.39)	-0.397*** (-26.30)	-0.428*** (-28.60)	-0.402*** (-27.59)
Observations	25057	27892	27502	28978

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Dependent variable is the logarithm of inflation-adjusted labor market annual income. Includes controls for age. Omitted categories are US states, male, less than 12th grade.

Table 4: Average marginal effects of sex and ethnicity of wage income

	21-30		31-40		41-50		51-60	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	No FE	FE	No FE	FE	No FE	FE	No FE	FE
Female=1	-0.208*** (-13.446)	-0.266*** (-17.419)	-0.332*** (-20.652)	-0.397*** (-26.347)	-0.385*** (-24.654)	-0.427*** (-28.487)	-0.383*** (-25.637)	-0.401*** (-27.564)
Hispanic	-0.082*** (-4.844)	0.012 (0.682)	-0.184*** (-10.068)	-0.023 (-1.304)	-0.207*** (-9.785)	-0.051* (-2.534)	-0.225*** (-9.699)	-0.094*** (-4.162)
Observations	25057	25057	27892	27892	27502	27502	28978	28978

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: calculated from baseline wage model (see table 3). Standard errors calculated with the Delta method. Omitted categories are no- Hispanic and male. Columns 2, 4, 6, and 8 include educational degree fixed effects.

Table 5: Differential returns to education by Latino origin

	21-30	31-40	41-50	51-60	
	No FE	No FE	No FE	No FE	FE
Hispanic	0.198** (2.85)	0.268*** (3.48)	0.288*** (3.76)	0.086 (1.24)	0.111 (1.63)
Hispanic $\times$ 12th grade, no diploma	-0.109 (-0.87)	-0.096 (-0.73)	0.081 (0.67)	-0.064 (-0.60)	-0.046 (-0.44)
Hispanic $\times$ HS diploma	-0.154* (-2.11)	-0.219** (-2.62)	-0.230** (-2.77)	-0.052 (-0.73)	-0.066 (-0.94)
Hispanic $\times$ Some college	-0.175* (-2.33)	-0.258** (-3.10)	-0.273*** (-3.31)	-0.198* (-2.52)	-0.237** (-3.06)
Hispanic $\times$ Associate's degree	-0.291** (-3.27)	-0.272** (-3.05)	-0.308*** (-3.48)	-0.164 (-1.91)	-0.180* (-2.12)
Hispanic $\times$ BA degree	-0.213** (-2.83)	-0.373*** (-4.45)	-0.380*** (-4.57)	-0.274*** (-3.33)	-0.292*** (-3.67)
Hispanic $\times$ Graduate degree	-0.309*** (-3.36)	-0.287** (-3.13)	-0.389*** (-4.36)	-0.178* (-1.98)	-0.179* (-2.01)
Female=1	-0.267*** (-17.67)	-0.241*** (-26.46)	-0.346*** (-22.58)	-0.395*** (-27.51)	-0.345*** (-23.22)
R-squared	0.157	0.176	0.218	0.181	0.214
N	25057	25057	27892	27502	28978

* p<0.05, ** p<0.01, *** p<0.001

Note: Dependent variable is the logarithm of inflation-adjusted labor market annual income. Columns 2, 4, 6, and 8 include 2-digit NAICS occupation fixed effects. All models control for region of birth, citizenship, age, disability, and PUMA of residence.

Table 6: Average marginal differential returns to education by Latino origin

	21-30		31-40		41-50		51-60	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	No FE	FE	No FE	FE	No FE	FE	No FE	FE
Hispanic	0.0183 (1.03)	0.0193 (1.10)	-0.00530 (-0.29)	0.00581 (0.32)	-0.0236 (-1.19)	-0.0250 (-1.29)	-0.0696** (-3.02)	-0.0620** (-2.73)
Female=1	-0.267*** (-17.67)	-0.241*** (-15.46)	-0.394*** (-26.46)	-0.346*** (-22.58)	-0.421*** (-28.51)	-0.364*** (-23.33)	-0.395*** (-27.51)	-0.345*** (-23.22)
Observations	25057	25057	27892	27892	27502	27502	28978	28978

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Columns 2, 4, 6, and 8 include 2-digit NAICS occupation fixed effects. The model corresponds to that of table 5. Standard errors calculated with the Delta method.



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