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September 2025

Online at <https://mpra.ub.uni-muenchen.de/126532/>  
MPRA Paper No. 126532, posted 20 Oct 2025 06:47 UTC

# Higher Education as Regional Development: Labor Market Impacts of Nigeria’s 2011 Federal University Expansion

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Sept, 2025

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## Abstract

This paper examines the causal impact of higher education expansion on regional labor markets and human capital development. Exploiting the 2011 establishment of nine federal universities across previously underserved Nigerian states, we implement a difference-in-differences approach to analyze effects on employment, wages, job quality, and sectoral composition. Our results show significant positive effects on employment and wages, with particularly strong impacts for youth and in urban areas. We find evidence of both direct employment effects and broader spillovers to private sector activity such as self-employment, suggesting universities can serve as catalysts for regional economic development. Our findings contribute to understanding the role of higher education institutions in human capital formation and labor market development in emerging economies.

**JEL Classification:** I25, J21, O15, H52, R11

**Keywords:** Higher Education, Labor Markets, Economic Development, Regional Growth, Universities, Employment, Wages, Nigeria

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<sup>§</sup>We thank Jonathan Smith, Daniel Kreisman, Georgia State University Economics PhD Seminar participants, and others for their helpful comments, suggestions, and feedback.

# 1 Introduction

Higher education is widely seen as a cornerstone of human capital formation and economic development<sup>1</sup>. Decades of research in advanced and emerging economies have established that individuals with more education or exposure to more education generally result in higher wages, face lower unemployment, and work in better quality jobs than those with less schooling (Card, 1999; Becker, 1964). Recent evidence from the literature further supports these claims (Carnevale et al., 2013; Deming and Noray, 2020; U.S. Bureau of Labor Statistics, 2024)<sup>2</sup>. These private returns to education often extend beyond the individual, yielding positive externalities: for example, states or regions that experienced a large increase in college graduates saw significant gains in local firms (Moretti, 2004). At the micro level, a greater density of universities and college-educated workers has been linked to faster economic growth (Valero and Van Reenen, 2019). Such findings underpin a broad consensus that expanding access to higher education can be a powerful driver of labor market advancement and innovation in an economy (Moretti, 2004; Valero and Van Reenen, 2019)

Yet important debates remain about the role of higher education in development, especially in low-income and emerging economies. In many sub-Saharan African countries, tertiary enrollment rates are the lowest in the world (Bloom et al., 2014), even as the estimated returns to higher education are quite high by global standards (Oketch, 2016; Katzkowitz et al., 2023; Lavy et al., 2024). Persistent barriers— from financial constraints to limited institutional capacity— leave college opportunities out of the reach for much of the population (Teal, 2011; Lavy et al., 2024). Consequently, educational attainment and labor market outcomes are often shaped by the birth lottery of the family background and location (Katzkowitz et al., 2023). At the same time, observers question whether expanding college access in economies

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<sup>1</sup>This is why the World Bank emphasizes education as a cornerstone of development (Filmer and Rogers, 2019; Filmer et al., 2017)

<sup>2</sup>Although earnings vary across professional fields—such as STEM, business, and the humanities—the overall economic returns to higher education remain significantly greater compared to those attained by individuals with only a high school diploma or less.

with scarce high-skill jobs will truly yield broad benefits (Shimeles, 2016)? For instance, Nigeria’s labor market has struggled to absorb a growing pool of graduates, with graduate unemployment estimated around 22 percent (Dabalén et al., 2001)<sup>3</sup>. These patterns highlight a critical need for causal evidence on how increasing higher-education supply affects labor market development in low-income settings, where outcomes could diverge from those in the US or Europe.

While rigorous studies have documented positive impacts of schooling expansions at the primary and secondary levels<sup>4</sup>, far less is known about the labor market consequences of expanding tertiary education in the developing world. Recent research is beginning to fill this gap: in Ecuador, a reform to eliminate public university tuition led to a surge in college enrollment and a shift of workers to higher-skill occupations (Molina and Rivadeneyra, 2021), and in Uruguay, the construction of new university campuses in underserved areas greatly increased local enrollment (especially among first-generation students) without lowering academic success, also increasing high school completion in those communities (Katzkowitz et al., 2023). However, evidence from sub-Saharan Africa remains especially scarce.

This study provides new causal evidence on the impact of higher education expansion on the labor market in Africa’s most populous country. We analyze the 2011 establishment of nine new federal universities in Nigeria, a policy that targeted states that previously lacked any federal university. This initiative created a natural experiment: Certain states experienced a sudden and significant increase in local higher education capacity, while others did not, largely independent of prior economic trends. We exploit this quasi-experimental policy shock using the Difference-in-Differences (DiD) design, comparing changes in labor market outcomes in the treated states with those in the control states over the same period. By fo-

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<sup>3</sup>Similar concerns were raised after China’s mass university expansion around 1999, which doubled college enrollments but initially left thousands of new graduates unable to find jobs (Li et al., 2025)

<sup>4</sup>-For example, Indonesia’s famous school construction program boosted young cohorts’ education and earnings (Duflo, 2001)

cusing on this unique setting, our study isolates the causal effects of introducing a university in an underserved region, thereby shedding light on how institutional investments in higher education translate into labor market changes in a developing country context.<sup>5</sup>

As illustrated in Figure 1, our study provides a relatively large employment estimate, highlighting the role of post-secondary institutions as a key driver of regional job creation. This stands in comparison with prior quasi-experimental evidence, which generally shows modest but positive employment responses to institutional or industrial expansions. Lee (2019), finds small yet persistent gains in local employment concentrated in education and services. Zheng (2021), in “Job Creation or Job Relocation?”, documents contained but significant employment growth from China’s Special Economic Zones, while Durongkaveroj (2022) reports a slight increase in native employment following Thailand’s SEZ rollout due to displacement in informal sectors. Similarly, Ferhat (2022) and Lehnert et al. (2024) find modest, skill-biased effects of university openings in Europe, whereas Alpino et al. (2025), in “Labor Market Spillovers of a Large Plant Opening: Evidence from the Oil Industry,” identify a stronger, though sector-specific, employment multiplier. Taken together, these studies suggest that most place-based or institutional expansions yield localized and moderate employment gains. Against this backdrop, our larger estimate indicates that expanding higher-education infrastructure—particularly in underserved regions—can serve as a potent catalyst for local labor-market growth and structural transformation.

Our study contributes to the labor economics, education, and development literature in three important ways. First, it provides one of the first quasi-experimental estimates of the labor-market impact of higher education expansion in Sub-Saharan Africa, leveraging the

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<sup>5</sup>Recent studies (e.g., Lehnert et al. (2024); Ferhat (2022); Lee (2019)) consistently find that the establishment of new universities contributes to increases in local employment and wages, particularly over the medium to long term. While some researchers attribute these gains to higher-skilled hiring, wage growth, and increased demand for more educated workers, others emphasize broader mechanisms such as aggregate multiplier effects and expansions in total labor input.

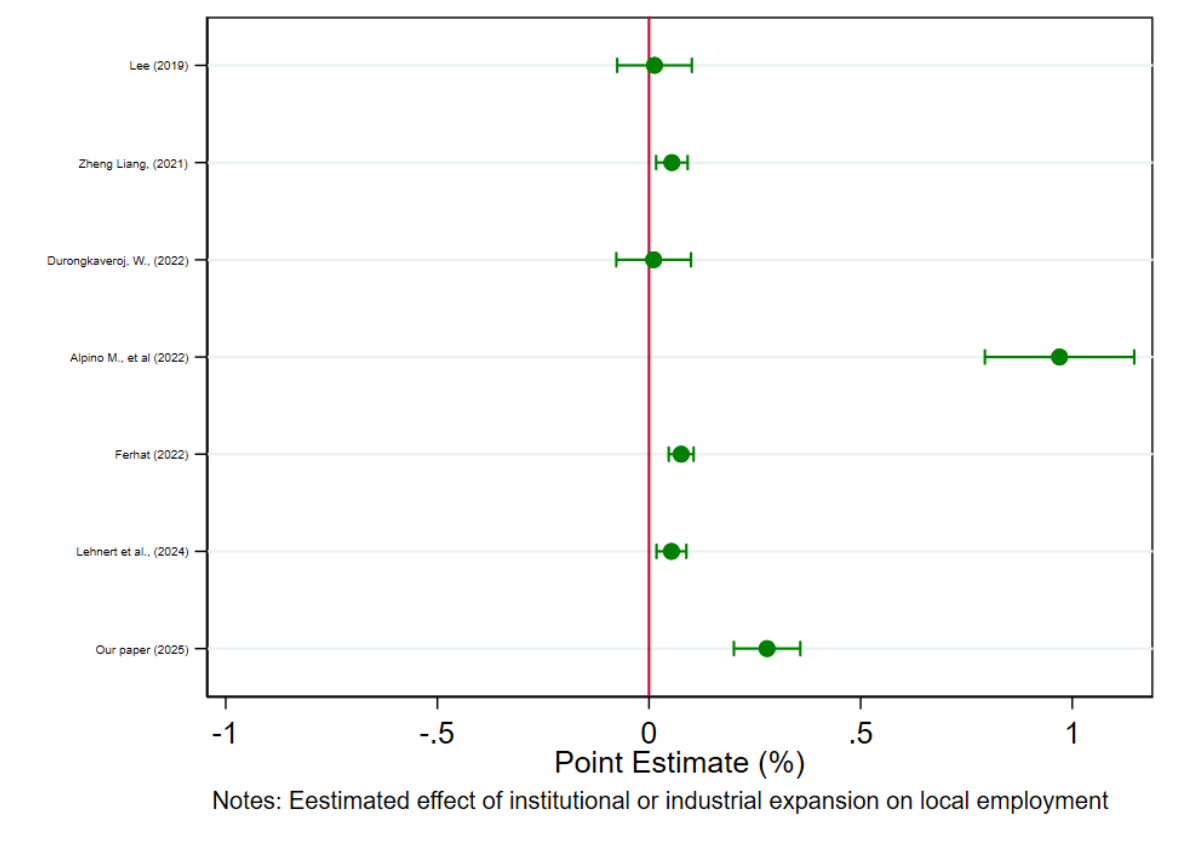
2011 establishment of twelve federal universities in Nigeria as a large, policy-driven natural experiment.<sup>6</sup> By exploiting spatial and temporal variation in exposure to new campuses, the analysis isolates the causal effects of post-secondary expansion on local employment. Second, the paper broadens the existing evidence base—largely derived from advanced economies—by showing that the employment effects of new universities can be substantially larger in developing contexts, where tertiary institutions serve not only as centers of learning but also as anchors of regional economic activity. Third, it contributes to ongoing debates on higher education as a regional development policy by demonstrating that university establishment produces measurable gains in both skilled and service-sector employment, with additional spillovers into non-academic sectors. Taken together, the findings reframe university expansion as an under-recognized yet powerful instrument for inclusive growth and labor-market transformation in emerging economies.

These findings highlight the potential of higher education investment to promote gender and youth inclusion in the labor market, consistent with recent evidence that closing education gaps can improve women’s employment outcomes (Oudanou et al., 2024). By providing the first rigorous micro-evidence that tertiary education expansion can directly boost employment, wages, and economic dynamism in the ECOWAS region, our study fills an important gap in the development literature. It complements prior macro-level analyses showing that higher education is associated with long-run growth (Valero and Van Reenen, 2019), and extends recent quasi-experimental research from other settings (e.g. China’s college expansion) which found higher schooling raised earnings (Huang et al., 2022). In contrast to panel studies suggesting that a surge of graduates in Africa might increase unemployment in the absence of new opportunities (Valero and Van Reenen, 2019), our results

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<sup>6</sup>Our estimates show that the creation of new universities in previously underserved states led to a broad-based rise in employment—approximately a 27.9 percentage point increase in the employment rate relative to control areas. Notably, this surge includes growth in informal work, suggesting that the universities operated as local economic engines, both absorbing labor through direct and indirect hiring and stimulating demand for surrounding services.

Figure 1: Our Study in Context: Comparing Employment Estimates from Recent Studies



Notes: Each point represents the estimated effect of institutional or industrial expansion on local employment from recent quasi-experimental studies. Horizontal bars denote 95% confidence intervals. Estimates are scaled for comparability and expressed as percentage-point changes in employment. Studies include Lee (2019); Zheng (2021); Durongkaveroj (2022); Alpino et al. (2025); Ferhat (2022); Lehnert et al. (2024). The final estimate- bottom line, corresponds to this paper’s results on the labor-market impacts of Nigeria’s 2011 Federal University Expansion.

demonstrate that expanding universities can generate jobs and uplift local labor markets when the higher-education investment is targeted to underserved regions. Together, these contributions advance the understanding of education-led development by elucidating how and under what conditions higher education can serve as a catalyst for regional employment and inclusive growth in low-income economies.

## 2 Background: Higher Education in Nigeria

In the years following independence, Nigeria undertook deliberate efforts to restructure and expand its university system as a means of educating the emerging elite and driving national development. The foundation of this effort was the establishment of the country’s first university, the University College Ibadan, in 1948. Initially affiliated with the University of London, it later became an autonomous institution known as the University of Ibadan, located in present-day Oyo State (Oladejo, 2021). This was followed by the creation of the University of Nigeria, Nsukka, which began academic operations in 1960 in what is now Enugu State (Toye, 2023).

In recognition of Lagos’s status as the capital and its significance as an economic hub, the federal government established the University of Lagos in 1962. That same year, two other major institutions were founded: Ahmadu Bello University in Zaria, Kaduna State, and Obafemi Awolowo University in Ile-Ife, now in Osun State (Toye, 2023). These five institutions—Ibadan, Nsukka, Lagos, Zaria, and Ife—are collectively referred to as Nigeria’s “first-generation universities.” They were strategically located to serve the four regions into which the country was divided at the time: the Northern, Eastern, Western, and Mid-Western regions<sup>7</sup>.

As Ejoigu and Sule (2012) notes, these early universities were intentionally designed to offer innovative curricula that would break new ground in West African higher education. They sought to blend liberal arts education with disciplines deemed essential to the modernization and industrialization of the Nigerian economy. Following the civil war, the federal government further pursued the unification of the university system, aiming to harmonize academic programs and promote national unity and economic development (Anyanwu, O,

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<sup>7</sup>Before Nigeria adopted its current system of states and geopolitical zones, the country was divided into four main regions: Eastern, Northern, Western, and Mid-West. The four regional universities—Ibadan, Nsukka, Zaria, and Ife—were brought under federal control in 1975 (Otonko, Jake, 2012)

2010).

The University of Benin was established in 1970, marking a new phase in the expansion of federal higher education in Nigeria. By 1975, seven additional federal universities had been founded across various regions of the country (Abdulrahman, 2017)<sup>8</sup>. These institutions are commonly referred to as the second-generation universities (see Abdulrahman (2017) for a complete list).

The federal government deliberately distributed these universities across different geopolitical regions to address both economic and educational disparities while also cultivating a skilled and diverse workforce capable of contributing to national development. By 1980, the number of federal universities had increased to fifteen, reflecting the government's sustained commitment to expanding access to higher education. In 1985, the National Universities Commission (NUC), a statutory body under the Federal Ministry of Education, was formally empowered with regulatory and accreditation authority over Nigerian universities, consolidating oversight and quality assurance within the higher education sector.

The return to civilian rule in 1999 marked a turning point in Nigeria's higher education landscape, coinciding with renewed efforts to reform and expand the tertiary sector. However, the system was burdened with longstanding structural and financial challenges. In the final days of military rule, a significant policy shift occurred with the lifting of the ban on private tertiary institutions. That same year, the federal government approved the establishment of the country's first private universities: Igbinedion University (Okada), Babcock University (Ilishan-Remo), and Madonna University (Okija), all of which commenced operations in 1999 (Muftahu, Muhammad, 2021). The private university sector grew rapidly in the following decade. During the 2000s, the National Universities Commission (NUC) licensed

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<sup>8</sup>These include the University of Ilorin, University of Calabar, University of Jos, University of Maiduguri, Usmanu Danfodiyo University, Bayero University Kano, and the University of Port Harcourt.

dozens of new private institutions, many sponsored by religious organizations or corporate bodies. These universities emerged as an alternative to the overstretched public system, offering additional capacity and options for families able to afford the higher tuition fees. Despite their growth, private universities remain accessible primarily to affluent households, and they account for less than 10 percent of total university enrollment in Nigeria ([Ripples Nigeria, 2024](#)).

These trends continued into the late 2000s. By 2010, Nigeria’s tertiary enrollment had grown dramatically, yet demand still outstripped capacity. For example, analyses of Joint Admissions and Matriculation Board (JAMB) data in later years found that over a million candidates are turned away annually for lack of slots ([Adesulu, Dayo, 2018](#)). In 2018, one report lamented that with over 100 universities in Nigeria (federal, state, and private combined), the system could absorb only about 600,000 new undergraduates a year, far short of the 1.6+ million exam registrants ([Adesulu, Dayo, 2018](#)). In effect, the carrying capacity of universities has remained a binding constraint<sup>9</sup>.

## 2.1 The 2011 Federal University Expansion Program

In September 2011, the federal government opened nine new universities—spread across the nation<sup>10</sup>. Before admitting their first students, each university had to receive formal ap-

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<sup>9</sup>Throughout these decades, education analysts have reflected on the implications. Some argue that from the beginning, Nigeria’s university policies were driven as much by politics as by pedagogy – whether to balance regional demands or to channel oil wealth into visible nation-building projects ([Anyanwu, O, 2010](#)). Others emphasize that despite the expansion, the sector repeatedly suffered from “sporadic neglect” and underinvestment ([Okebukola, 2006](#)). As one scholar put it in the late 1970s, a dysfunctional university system would surely make for a malfunctioning country ([Otonko, Jake, 2012](#)) – a caution that has echoed through Nigeria’s policy debates. By 2010, analysts tended to see the Nigerian university system as both a remarkable success in mass access and a persistent work in progress: it had provided tens of thousands of graduates across fields, yet remained constrained by funding shortfalls, infrastructure gaps, and governance struggles ([Adesola, 1991](#); [Okebukola, 2006](#)). In sum, the period 1960–2010 was marked by dynamic growth driven by national goals (notably underpinned by oil revenues) and by equally formidable challenges, suggesting that any evaluation must blend quantitative achievements with a sober appraisal of systemic strain ([Anyanwu, O, 2010](#); [Okebukola, 2006](#))

<sup>10</sup>Lokoja (Kogi State), Lafia (Nasarawa State), Kashere (Gombe State), Wukari (Taraba State), Dutse (Jigawa State), Oye-Ekiti (Ekiti State), Dutsin-Ma (Katsina State), Otuoke (Bayelsa State), and Ndufu-Alike

proval from the National Universities Commission, the Ministry of Education’s regulatory body<sup>11</sup>, ensuring they met all requirements for accreditation, quality assurance, licensing, and alignment with national development goals.

Each of the nine universities was expected to admit at least about 2,000 students in its first intake 2013, and grow from there. In fact, projections suggested that once fully established, each new university could enroll around 5,000 new students per year, thereby absorbing approximately 45,000 additional students per year when combined ([Adedayo Ademuwagun, 2014](#))<sup>12</sup>.

Our treatment group consists of the nine Nigerian states that, for the first time, host one of the nine federal universities established under the Jonathan administration. Due to multiple reasons, we define treatment at the state level. First, each university’s presence generates economic and social spillovers that extend well beyond its immediate Local Government Area. Secondly, internal migration for education and economic opportunities is overwhelmingly intra-state in Nigeria<sup>13</sup>. Lastly, each university has two organs that provide oversight, the university Governing Council and the National Universities Commission (NUC), that ensure uniform standards and accountability across the state, firmly bind access and benefits to

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(Ebonyi State)

<sup>11</sup>NUC is the regulatory body responsible for overseeing university education in Nigeria. Its functions are: regulation and accreditation; quality assurance; licensing; policy and advisory roles

<sup>12</sup>Admission into any of the nine newly established federal universities in Nigeria adheres to the same process and standards as those governing existing federal institutions. The admission process involves multiple stages. First, prospective students must obtain a minimum of five to seven credits in their Senior Secondary Certificate Examination (SSCE), including compulsory passes in English Language and Mathematics. Second, candidates are required to register for and sit the Unified Tertiary Matriculation Examination (UTME), administered by the Joint Admissions and Matriculation Board (JAMB), and must meet or exceed the designated cut-off marks for their intended programs. Third, upon successful completion of the UTME, applicants must proceed to register through the university’s official admission portal, pay the prescribed registration fees, and participate in a post-UTME screening or entrance examination conducted independently by the university.

<sup>13</sup>Nigerians seeking employment, education, or commerce overwhelmingly migrate within their own state rather than crossing state borders. The 2019 IOM country profile reports that internal migrants are concentrated along intra-state corridors—only a small fraction relocate across states—making state of residence the relevant unit for exposure to a new university ([National Population Commission , Nigeria](#))

state residency.

## 3 Data

To uncover the causal effect of these universities on labor outcomes, we use multiple data sources. In this section, we describe each data source and provide descriptive statistics for our sample.

### 3.1 General Household Surveys-GHS

We use multiple waves of General Household Surveys (GHS) to obtain data on the outcomes of interest, as well as other covariates that we use in our analysis and for uncovering potential mechanisms driving the main results. We combine four GHS waves: one, two, three, and four. The first wave was conducted in 2010/2011, the second wave was in 2012/2013, while the two following waves were conducted in 2015/2016 and 2018/2019, respectively.

GHS is a nationally representative survey that provides information on labor, food consumption, and expenditures. It comprises of sixty primary sampling units or enumeration areas (EAs) chosen from each of the 36 states plus the FCT in Nigeria (Idris, 2024). The survey resulted from a collaboration between the National Bureau of Statistics (NBS), the Federal Ministry of Agriculture and Rural Development (FMA&RD), and the National Food Reserve Agency (NFRA), with support from the Bill and Melinda Gates Foundation (BMGF) and the World Bank.

GHS also provides detailed information on individual and household characteristics. This allows us to undertake heterogeneity analysis along with examining potential mechanisms that drive our outcome variable. A potential mechanism that may impact employment that we considered is the hours worked.

## 3.2 National University Commission

We obtained a comprehensive list of universities from the National Universities Commission-NUC ([National Universities Commission, 2024](#)). NUC covers the full spectrum of accredited universities across Nigeria and includes detailed information on their geographic locations. This geolocation data allows us to identify states that have federally owned universities in Nigeria. Additionally, the dataset includes the establishment dates of the institutions, enabling us to identify when each university began offering academic services. We used this to examine how the establishment of university education in a state shapes labor outcomes. [Figure 2](#) presents a comparative bar chart illustrating the distribution of federal universities across the six geopolitical regions of Nigeria, categorized by their period of establishment, pre-2011 and 2011.

## 3.3 Descriptive Statistics

We present descriptive statistics and balance of covariates comparing individuals in treatment and control states during the pre-treatment period. Recall that the treatment states are those that received new federal universities in 2011. In [Table 2](#), the share of individuals in agricultural work, youth (15- 35 years), and parental education in our treated group is higher when compared to our control group. However, other labor market indicators such as wage employment, formal sector employment, hours worked per week, and log-monthly wages appear similar across the two groups, suggesting broadly comparable baseline labor characteristics. As shown in [Figure 4](#), employment rates in both control and treatment states followed similar trends prior to the intervention. However, we observe a slight increase in employment in the treatment states around 2016, which we attribute to the establishment of the new federal universities. In general, we show that most of the covariates are relatively balanced between the two groups.

## 4 Empirical Strategy

Our empirical approach exploits the introduction of federal universities across Nigerian states in 2011 to identify causal effects on local labor market outcomes. The simultaneous establishment of nine new universities provides plausibly exogenous variation in access to tertiary education across states, allowing us to implement a difference-in-differences design.

### 4.1 Identification Strategy

We estimate intention-to-treat (ITT) effects rather than the effect of university attendance per se. Data limitations necessitate this approach: the Nigeria General Household Survey does not track whether respondents attended the newly established institutions. Our ITT estimates capture the reduced-form impact of expanded university access on all working-age individuals in treatment states, incorporating both direct effects (through increased educational attainment) and indirect effects (through local economic spillovers).

The baseline specification takes the following form:

$$Y_{ist} = \alpha + \beta \cdot \mathbf{1}[\text{Treated}_s \times \text{Post}_t] + \lambda_s + \theta_t + \mathbf{X}'_{ist}\gamma + \varepsilon_{ist} \quad (1)$$

where  $Y_{ist}$  denotes the outcome for individual  $i$  in state  $s$  at time  $t$ . The indicator  $\mathbf{1}[\text{Treated}_s \times \text{Post}_t]$  equals one for individuals in states that received a federal university after 2013 when the first cohort of students matriculated. State fixed effects  $\lambda_s$  control for time-invariant differences across states, while year fixed effects  $\theta_t$  account for common temporal shocks. The vector  $\mathbf{X}_{ist}$  includes individual-level controls for gender, age, and urban residence. Standard errors are clustered at the state level to address serial correlation within states over time.

The parameter of interest,  $\beta$ , captures the average difference in outcomes between treatment and control states after university establishment relative to pre-existing differences.

Under the identifying assumption of parallel trends,  $\beta$  represents the causal effect of university expansion on local labor markets.

## 4.2 Empirical Considerations

Several features of our setting strengthen causal identification. First, the 2011 expansion was implemented simultaneously across all treatment states, mitigating concerns about endogenous policy timing. Second, the policy aimed to achieve geographic balance in university access, with new institutions distributed across all six geopolitical zones. This reduces concerns that treatment assignment is correlated with unobserved state characteristics that affect labor market trajectories.

We define treatment timing based on student enrollment rather than university establishment. While all nine universities were formally established in February and March 2011, students first matriculated in the 2012/2013 academic session. We therefore set  $\text{Post}_t = 1$  for years 2013 onward, allowing a two-year lag for potential labor market effects to materialize. This conservative approach accounts for the time required for expanded educational access to have an impact on employment outcomes.

To examine heterogeneous treatment effects, we extend equation (1) by interacting the treatment indicator with demographic characteristics:

$$Y_{ist} = \alpha + \beta_1 \cdot \mathbf{1}[\text{Treated}_s \times \text{Post}_t] + \beta_2 \cdot \mathbf{1}[\text{Treated}_s \times \text{Post}_t \times \text{Female}_i] + \lambda_s + \theta_t + \mathbf{X}'_{ist} \gamma + \varepsilon_{ist} \quad (2)$$

This specification allows treatment effects to vary by gender, capturing potential differences in how university expansion affects the labor market outcomes of males and females.

### 4.3 Robustness Tests

We implement several robustness checks to validate our findings. First, we examine pre-treatment trends by plotting the trends in employment by year relative to the university's establishment. Evidence of differential pre-trends would violate the parallel trends assumption underlying our identification strategy.

Second, we address concerns about systematic differences between treatment and control states by implementing two alternative definitions of the control group. Our first robustness check excludes states with historical federal universities, comparing treatment states only to those without any federal university presence. This addresses potential spillovers from established institutions. Our second check uses only states without universities as controls, providing the sharpest counterfactual for evaluating treatment effects.

Third, we explore sensitivity to treatment timing by varying the definition of the post-treatment period. While our baseline specification assumes effects begin in 2013, we also estimate models with alternative start dates to capture both immediate and delayed impacts of university establishment.

These robustness tests, combined with the plausibly exogenous nature of the 2011 expansion, support a causal interpretation of our estimates. The consistency of results across specifications strengthens confidence that we identify the actual effect of expanded university access on local labor market outcomes.

## 5 Results

This section presents the results for the key outcomes under investigation. We report estimates based on the specification outlined in Equation 1. To assess the credibility of our

findings, we conduct several robustness checks. We conclude by exploring potential mechanisms through which exposure to newly established federal universities may have influenced observed changes in employment.

## 5.1 Main Results

Table 3 presents the core difference-in-differences (DiD) estimates assessing how the 2011 federal university expansion influenced aggregate employment outcomes. Across all specifications, the DiD interaction term (Treated  $\times$  Post) is consistently positive and highly statistically significant at one percent, with a point estimate of approximately 0.279 in the most complete specification (Column 4). This implies that, controlling for fixed effects and relevant covariates, employment in treated states increased by roughly 27.9 percentage points following the university rollout relative to non-treated states.

Importantly, the dependent variable is a composite employment indicator that includes wage employment, self-employment, agricultural work, and subsistence activities. Thus, the results capture broad labor market engagement, not just formal sector absorption. The robustness of the estimates across models, with and without year and wave fixed effects, underscores the reliability of the identified treatment effect. This finding supports the hypothesis that university establishment acts as a localized economic stimulus. As university ecosystems emerge, they may generate both direct employment (e.g., administrative, academic, construction jobs) and indirect opportunities through service demand, housing, and retail spillovers.

In Table 4, we explore whether employment gains were accompanied by improvements in job quality. The results are mixed but instructive. First, in Column 1, the university expansion significantly increased monthly wages, with a coefficient of 0.419 ( $p < 0.01$ ), suggesting roughly a 52 percent increase in log wages among treated individuals. This

substantial effect implies that higher education access catalyzed productivity improvements and elevated earnings potential. Column 2 reveals that hours worked per week rose by approximately 4.75 hours, also significant at the one percent level. This could reflect both increased labor demand and greater labor supply, possibly driven by rising opportunity costs of inactivity due to new economic dynamism. Conversely, Column 3 presents a modest but statistically significant decline in formal sector employment (coefficient: -0.028). This suggests that while employment and wages rose, the jobs generated may predominantly be in informal sectors or temporary/low-security positions, at least in the short run. This duality highlights an important policy implication: university-led regional development may expand employment, but additional institutional support is necessary to promote quality and formality. Overall, our findings are consistent with existing literature, which indicates that over 90 percent of employment in Nigeria is derived from the informal sector ([Balboni et al., 2024](#); [International Labour Organization, 2018](#)).

## 5.2 Heterogeneity and Robustness

We next turn to establish the robustness of our estimates presented in Table 3. We conduct heterogeneity and robustness checks in Table 5, 6

We start from Table 5 which shows the disaggregates of the employment effects across gender and age cohorts. Striking asymmetries emerge: For males (Column 1), the DiD estimate is negative (-0.103), indicating a decline in employment post-expansion, whereas for females (Column 2), the effect is strongly positive (0.329). This divergence may reflect the types of jobs created—e.g., service-oriented roles and educational support work, traditionally dominated by women. It may also suggest that university environments provided safer, more accessible, or more socially acceptable entry points for female labor participation. For age, considering youth (15–35), the employment impact is highly positive (0.583, Column 3), while for non-youth (36+), it is sharply negative (-0.792, Column 4). This again points

to a youth-skewed labor market response, likely tied to the education sector’s alignment with younger demographics and the digital/service economy. Our findings are consistent with data from the Nigerian Bureau of Statistics, which show that female informality rates exceed those of males ([National Bureau of Statistics, 2023](#)).

In Table 6, we assess whether the main results hold under alternative control group definitions: In column 1, we use all untreated states. While column 2 excludes states with historical universities. Then column 3 restricts the control group to states without any universities at all. Across all models, the treatment effect remains consistently positive and statistically significant. This robustness check strengthens confidence in the causal interpretation of the results and rules out the possibility that prior university infrastructure or pre-treatment trajectories in control states are biasing the estimates. It also demonstrates that federal university presence per se, not just university history, matters for employment dynamics.

### 5.3 Labor Market Mechanisms

Finally, in Table 7, we probe potential mechanisms. We use the same equation 1 specified earlier. Willingness to Work (Column 1): The estimate of 0.052 indicates a higher readiness to participate in the labor force in treated states. This likely reflects increased motivation and perceived opportunity, especially among youth and women. Agricultural Work (Column 2): The coefficient of 0.250 suggests a marked rise in agricultural labor, possibly due to increased local demand for food and services or reclassification of subsistence activities as productive labor. These findings imply that university expansion may activate latent labor, drawing in those previously out of the labor force or informally engaged, and boost peripheral sectors like agriculture through economic linkages.

## 6 Discussion

This study provides compelling evidence that the strategic expansion of federal universities in Nigeria yielded significant labor market benefits, particularly in underserved regions. The use of a robust difference-in-differences approach strengthens the internal validity of the findings, confirming that observed effects were not driven by pre-existing trends or confounders. Across Tables 3 - 10, we demonstrate that the establishment of nine new universities in 2011 was associated with a broad increase in employment, higher wages, and reallocation of labor across demographic groups and sectors.

The core findings in Table 3 show that the employment rate rose by approximately 27.9 percentage points in treated states post-expansion. This increase is notable given that the employment indicator captures both formal and informal labor, including self-employment and agricultural work. The sizable magnitude and consistent direction across specifications suggest that new universities acted as localized engines of labor absorption, through direct hiring, construction, and demand for services (Valero and Van Reenen, 2019; Moretti, 2004).

Crucially, Table 4 uncovers qualitative shifts in labor market conditions. Monthly wages increased significantly (by roughly 52 percent), and hours worked also rose. However, the modest decline in formal sector employment raises important caveats. It implies that while economic activity increased, many of the newly created jobs may have been informal or precarious, reflecting a broader structural challenge in Nigeria’s labor market, where over 90 percent of employment is informal (Balboni et al., 2024; International Labour Organization, 2018). This underscores the need to complement educational expansion with policies that formalize work and ensure decent labor conditions.

The demographic breakdown in Table 5 reveals a striking asymmetry: females and youth gained disproportionately, whereas males and older adults saw either smaller or negative

employment effects. Specifically, young individuals aged 15–35 experienced a 58.3 percentage point increase in employment, compared to a 79.2 percentage point decline among older adults. These divergent patterns reflect the fact that university ecosystems tend to align with youth-centric and service-oriented job creation (Deming and Noray, 2020), while older workers may lack the skills to adapt or the opportunity cost might be higher. Similarly, the positive effect for women (33 percent) could indicate reduced barriers to labor force participation in university-hosting communities, including enhanced safety, demand for care and educational roles, or social acceptance of female employment (Bloom et al., 2014; National Bureau of Statistics, 2023).

Robustness checks in Table 6 and placebo tests in Table 9 confirm the consistency of the results. Regardless of the control group definition, whether all untreated states, only those with no prior federal universities, or those without any universities, the treatment effects remain unchanged. This strengthens the causal interpretation and confirms that the observed effects are not artifacts of state-specific characteristics.

The study also examines mechanisms of change in Table 7. A significant increase in the “willingness to work” metric (5.2 percent) suggests that exposure to a university environment may increase labor market aspirations, even among those not directly enrolled. Moreover, agricultural employment rose by 25 percent, potentially reflecting backward linkages, such as higher food demand or reclassification of previously subsistence-level work into monetized agriculture. These results are consistent with broader evidence that human capital investments create local multipliers through labor demand and consumer spending (Gennaioli et al., 2013; Charles, 2006).

Our estimates for the Urban-rural dynamics further clarify the spatial heterogeneity of the impact. Table 8 shows that urban areas experienced both employment and wage gains,

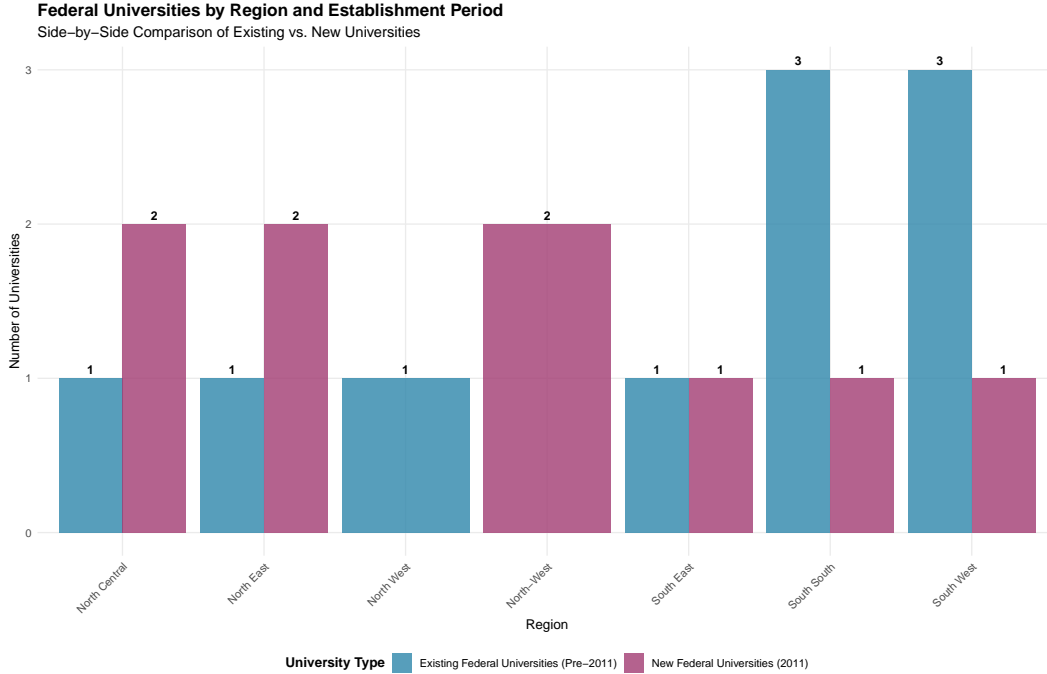
while rural areas recorded a decline in employment despite modest wage growth. This suggests that urban areas were better equipped to absorb the positive spillovers of university expansion, likely due to stronger market linkages, existing infrastructure, and access to complementary services. These findings resonate with the notion that place-based policies in developing economies require aligned investments in infrastructure and connectivity to avoid reinforcing spatial inequalities (Kline and Moretti, 2014; Scott, 2009). Finally, Table 10 illustrates a reshuffling of labor sectoral composition. While public sector employment declined significantly, there were notable increases in NGO/international employment and self-employment. This indicates a diversification of employment opportunities, consistent with theories that universities attract both civil society actors and entrepreneurial ventures (Chatterton and Goddard, 2000). However, the negligible change in private sector employment points to structural limitations in Nigeria’s ability to scale up formal enterprise in tandem with educational supply.

## 7 Conclusion

This paper provides compelling causal evidence that expanding higher education in a low-income country context can act as a powerful instrument for regional development and labor market improvement. By examining Nigeria’s university rollout, we show that the establishment of new universities produced sizable labor-market dividends, from substantially higher employment rates and earnings to enhanced inclusion of women and youth. These outcomes reinforce the scholarly view that human capital investments can yield broad economic benefits: our results align with global findings that link greater university presence to economic growth (Valero and Van Reenen, 2019; Van Reenen and Valero, 2016), while offering novel, context-specific insights for sub-Saharan Africa. In particular, the evidence that young people and females realized disproportionate gains in employment underscores

the role of higher education as a force for social inclusion in the labor market, echoing recent African research on education narrowing gender gaps in formal employment (Oudanou et al., 2024). At the same time, our conclusions are nuanced by the observation that many of the new jobs were informal. The surge in employment without a commensurate rise in formal jobs (and an actual slight dip in formal employment) suggests that university-led growth, in this context, predominantly activated the informal sector and latent labor supply. This finding resonates with development challenges noted in the literature – for example, the predominance of informal work in African economies, and signals that while higher education expansion can jump-start local economies, complementary policies are needed to translate educational gains into quality jobs. Overall, our study’s contribution lies in firmly establishing that tertiary education expansion can be a catalyst for job creation and wage growth even in low-income settings, thereby filling a crucial gap in the empirical literature on education and labor markets in Africa. It provides a robust evidence base to inform both scholars and policymakers that, with the right conditions, investing in universities can foster inclusive economic advancement, validating longstanding theories of education-led development and offering guidance on leveraging human capital for regional growth. Our conclusions reinforce the importance of integrating higher education policy into broader development strategies and invite further research into how such interventions can be optimized to maximize formal employment and sustainable, inclusive development outcomes.

Figure 2: Distribution of Federal University across the Six Geo-political Zones



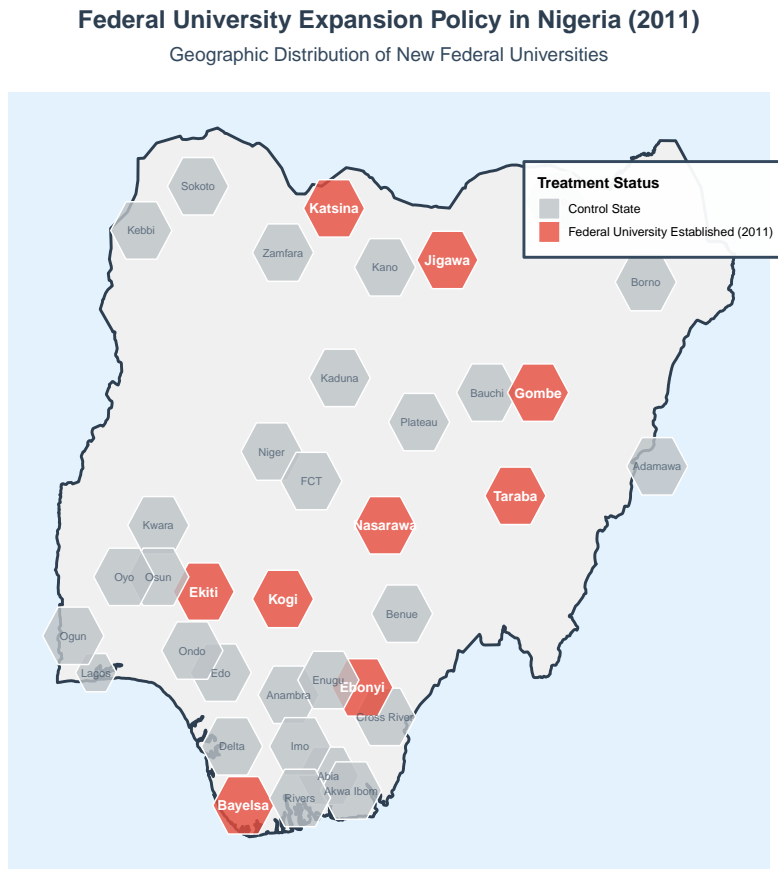
*Notes:* This bar chart displays the distribution of federal universities across Nigeria’s six geopolitical zones, comparing institutions established before 2011 with those created in 2011. Blue bars represent existing federal universities (pre-2011), while Purple bars represent the new federal universities established in 2011. Every geopolitical zone has at least one federal university, and the 2011 expansion ensured that each zone received additional institutions to improve equitable access to tertiary education. The policy was implemented simultaneously across all zones during February–March 2011, and the universities commenced operations in the 2013/2014 academic session. Data Source: National Universities Commission (NUC) and Federal Ministry of Education administrative records.

Table 1: Federal Universities Established in 2011

University	State	Region
Federal University, Dutse	Jigawa	North-West
Federal University, Dutsin-Ma	Katsina	North-West
Federal University, Kashere	Gombe	North East
Federal University, Lafia	Nasarawa	North Central
Alex Ekwueme University, Ndufu-Alike	Ebonyi	South East
Federal University, Lokoja	Kogi	North Central
Federal University, Otuoke	Bayelsa	South South
Federal University, Oye-Ekiti	Ekiti	South West
Federal University, Wukari	Taraba	North East

*Notes:* Information compiled from official government documents. Most universities began operations between 2012 and 2013.

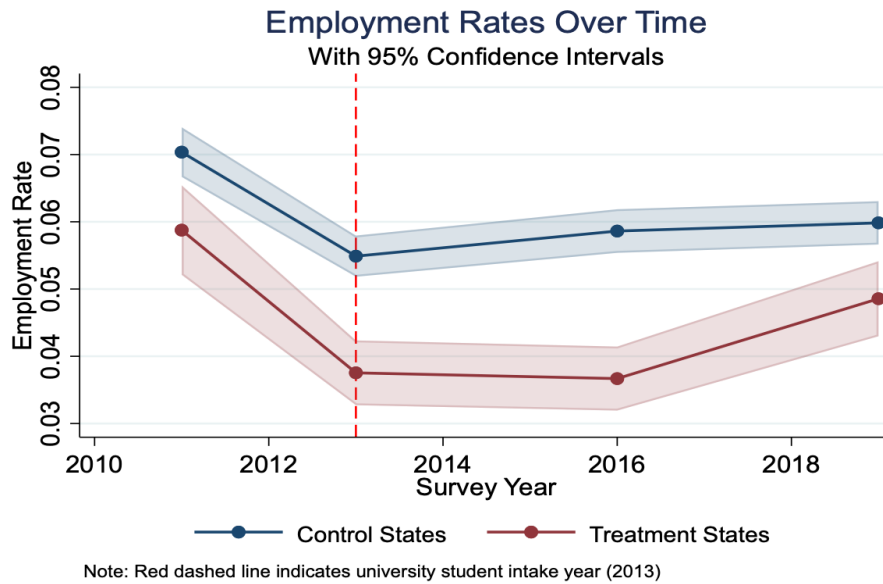
Figure 3: Geographic Distribution of Federal University Expansion in Nigeria, 2011



Source: Federal Ministry of Education | Note: All universities opened February–March 2011

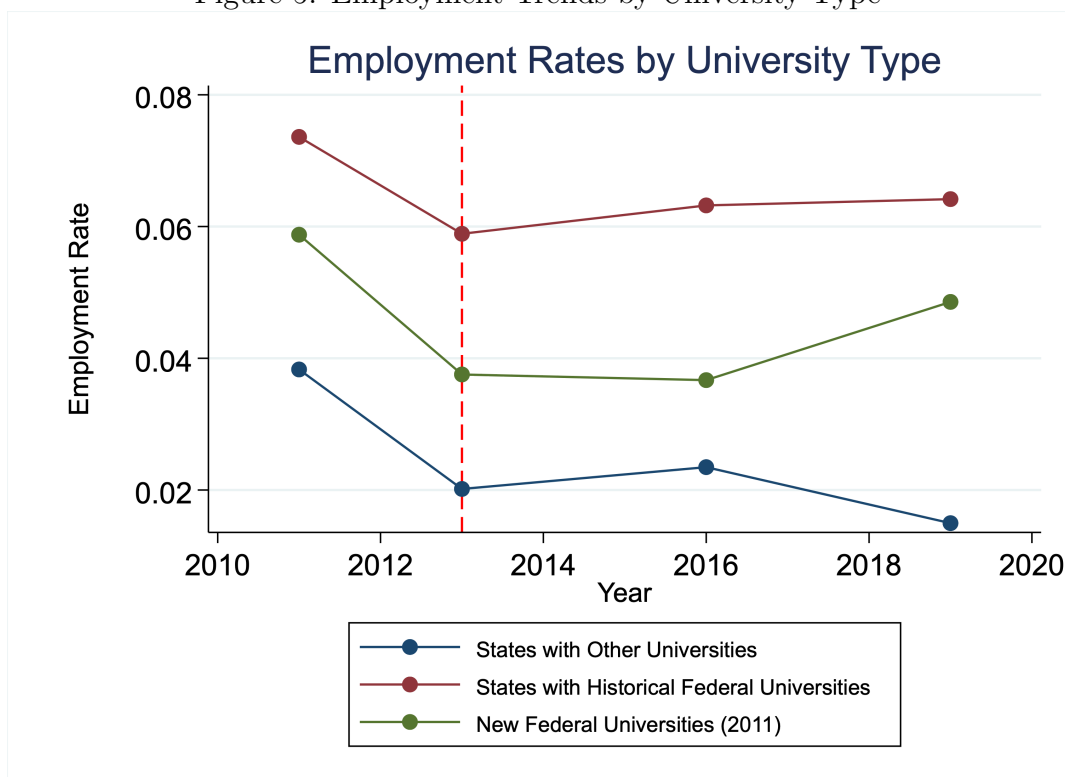
*Notes:* This map shows the geographic distribution of the 2011 federal university expansion policy in Nigeria. Treatment states (shown in red) received new federal universities, while control states (shown in gray) did not receive new universities. The nine treatment states are: Bayelsa (South-South), Ebonyi (South-East), Ekiti (South-West), Gombe (North-East), Jigawa (North-West), Katsina (North-West), Kogi (North-Central), Nasarawa (North-Central), and Taraba (North-East). All universities were established in February–March 2011 and began operations in the 2011/2012 academic session. The policy aimed to increase access to tertiary education and was implemented simultaneously across all six geopolitical zones of Nigeria. Data source: Federal Ministry of Education administrative records.

Figure 4: Employment Rates Over Time: Treatment vs. Control States



*Notes:* This figure shows the evolution of employment rates for treatment and control states from 2010 to 2019. Treatment states (red line) are those that received new federal universities in 2011, while control states (blue line) did not receive new universities. The vertical dashed red line indicates the university student intake year (2013), when the first cohort of students entered the new federal universities. Shaded areas represent 95% confidence intervals. Employment rates are calculated as the proportion of working-age individuals (ages 15-64) who report being employed in the Nigeria General Household Survey Panel. The graph provides visual evidence for the parallel trends assumption prior to treatment, showing that both groups followed similar employment trajectories before 2013. Data source: Nigeria General Household Survey Panel Waves 1-4 (2010-2019).

Figure 5: Employment Trends by University Type



*Notes:* This figure displays employment rate trends from 2010 to 2019 for three categories of Nigerian states based on their university infrastructure. “States with Other Universities” includes states that have state or private universities but no federal universities. “States with Historical Federal Universities” comprises states with federal universities established before 2011, including first-generation institutions (e.g., University of Ibadan, University of Nigeria Nsukka) and second-generation institutions (e.g., University of Port Harcourt, University of Maiduguri). “New Federal Universities (2011)” represents the nine treatment states that received federal universities under the 2011 expansion policy. The vertical dashed red line marks 2013, when the first cohort of students entered the newly established universities. The divergence in employment trends after 2013 suggests differential labor market impacts across states with varying levels of university infrastructure. States without any universities are excluded from this comparison to focus on the relative effects among states with different types of higher education institutions. Data source: Nigeria General Household Survey Panel Waves 1-4.

Table 2: Balance of Covariates: Pre-treatment Period

	Control		Treatment	
	mean	sd	mean	sd
Employment rate	0.451	0.498	0.469	0.499
Wage employment	0.070	0.256	0.059	0.235
Agricultural work	0.241	0.427	0.309	0.462
Formal sector employment	0.868	0.338	0.871	0.336
Hours worked per week	26.4	15.9	26.0	14.8
Monthly wage (Naira)	67121	292032	61643	85719
Log monthly wage	9.942	1.584	10.231	1.396
Female	0.700	0.459	0.659	0.475
Age (years)	25.0	17.9	22.4	15.0
Urban location	0.315	0.465	0.180	0.385
Youth (15-35 years)	0.379	0.485	0.429	0.496
Father has higher education	0.197	0.398	0.265	0.444
Mother has higher education	0.088	0.284	0.182	0.389
N	18,462		4,799	

Notes: This table presents the descriptive statistics and balance of covariates in the pre-treatment period for control and treatment states. The pre-treatment period is 2010-2012. Treatment states are those that received new federal universities in 2011. Standard deviations are displayed next to means. Employment rate refers to the proportion of individuals engaged in any form of employment. Wage employment refers to individuals working for wages or salaries. Agricultural work includes farming and related activities. Formal sector employment captures those working in registered businesses or government. The monthly wage is expressed in Nigerian Naira. All demographic variables are measured at the individual level.

Table 3: Impact of Federal University Establishment on Employment

	(1)	(2)	(3)	(4)
DiD interaction (Treated $\times$ Post)	0.252*** ( 0.002)	0.279*** ( 0.004)	0.279*** ( 0.004)	0.279*** ( 0.004)
Observations	2778	2778	2778	2778
State FE	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes
Wave FE	No	No	No	Yes
Controls	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the state level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The dependent variable is a comprehensive employment indicator that includes wage employment, agricultural work, self-employment, and subsistence activities. Treatment is defined as states that received new federal universities in 2011, with the post period beginning in 2013 when student enrollment started. Column (1) includes state fixed effects and controls for gender. Columns (2) and (3) add year fixed effects and control for urban location. Column (4) further adds survey wave fixed effects.

Table 4: Impact of Federal University Establishment on Job Quality Measures

	Log Monthly Wage (1)	Hours Worked (2)	Formal Sector Employment (3)
DiD interaction (Treated $\times$ Post)	0.419*** ( 0.069)	4.746*** ( 0.676)	-0.028*** ( 0.003)
Observations	1178	631	3662
State FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes

Notes: Robust standard errors clustered at the state level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . All models include constant term (not reported). The sample is restricted to employed individuals. The dependent variables are: (1) log of monthly wage, (2) hours worked per week, and (3) formal sector employment. Column (1) controls for urban location. Column (2) controls for gender and urban location. Column (3) controls for urban location. Treatment is defined as states that received new federal universities in 2011. Post is defined as years 2013 and later, when students began enrolling at these new universities.

Table 5: Heterogeneous Effects of Federal University Establishment on Employment by Demographic Groups

	By Gender		By Age Group	
	Males (1)	Females (2)	Youth (3)	Non-Youth (4)
DiD interaction (Treated $\times$ Post)	-0.103*** ( 0.025)	0.329*** ( 0.003)	0.583*** ( 0.000)	-0.792*** ( 0.000)
Observations	629	2149	539	845
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes	Yes
Sample	Males	Females	Ages 15-35	Ages 36+

Notes: Robust standard errors clustered at the state level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . All models include state and year fixed effects. The dependent variable is a comprehensive employment indicator that includes wage employment, agricultural work, self-employment, and subsistence activities. Columns (1)-(2) split the sample by gender. Columns (3)-(4) split the sample by age group, with youth defined as ages 15-35. All models control for urban location. Treatment is defined as states that received new federal universities in 2011. Post is defined as years 2013 and later, when students began enrolling at these new universities.

Table 6: Robustness Checks: Sensitivity to Control Group Definition

	Employment		
	All Controls (1)	No Historical Universities (2)	No Universities as Controls (3)
DiD interaction	0.279*** ( 0.004)	0.279*** ( 0.004)	0.279*** ( 0.004)
Observations	2778	2778	2778
State FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Wave FE	Yes	Yes	No
Controls	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes
Control Group	All	No Historical Univ.	No Univ.

Notes: Robust standard errors clustered at the state level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The dependent variable is a comprehensive employment indicator. Column (1) uses all non-treated states as controls. Column (2) excludes states with pre-existing federal universities from the control group. Column (3) uses only states with no universities of any kind as controls. All models include state and year fixed effects and control for gender and urban location. Columns (1) and (2) also include survey wave fixed effects. Treatment is defined as states that received new federal universities in 2011. Post is defined as years 2013 and later, when students began enrolling at these new universities.

Table 7: Effects of Federal University Establishment on Labor Market Mechanisms

	Willingness to Work (1)	Agricultural Work (2)
DiD interaction (Treated $\times$ Post)	0.052*** ( 0.004)	0.250*** ( 0.007)
Observations	14925	2771
State FE	Yes	Yes
Year FE	Yes	Yes
Wave FE	No	Yes
Controls	Yes	Yes
Clustered SE	Yes	Yes

Notes: Robust standard errors clustered at the state level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The dependent variables are: (1) willingness to work if job opportunity becomes available and (2) working in agricultural activities. Column (1) controls for urban location, while Column (2) controls for both gender and urban location and includes survey wave fixed effects. Treatment is defined as states that received new federal universities in 2011. Post is defined as years 2013 and later, when students began enrolling at these new universities. These outcomes may represent potential mechanisms through which university establishment affects labor market outcomes in treated states.

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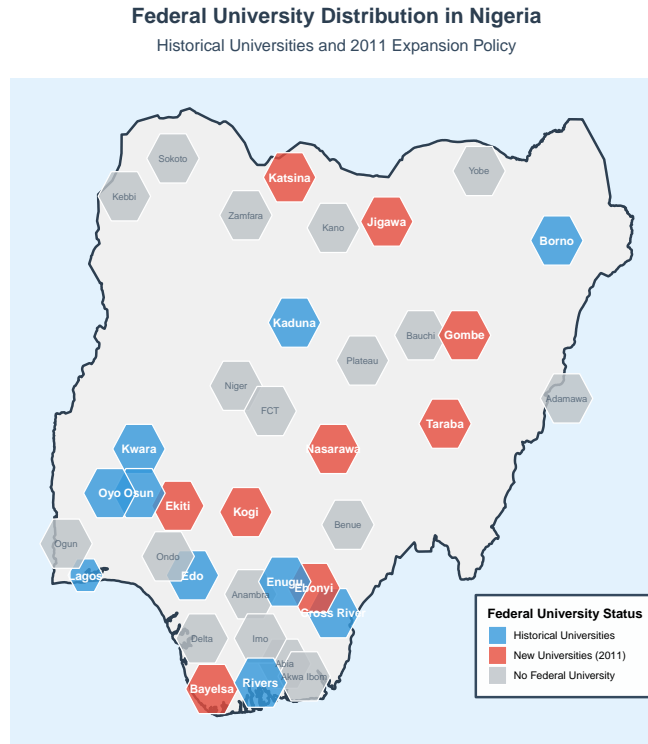
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## 8 Appendix Figures and Tables

Figure 6: Federal University Distribution in Nigeria: Historical and 2011 Expansion



*Notes:* This map displays the geographic distribution of federal universities across Nigeria, distinguishing between historical federal universities established before 2011 (shown in blue) and new federal universities established under the 2011 expansion policy (shown in red). States without any federal university are shown in gray. The ten states with historical federal universities are: University of Ibadan (Oyo State), University of Nigeria, Nsukka (Enugu State), Obafemi Awolowo University (Osun State), University of Lagos (Lagos State), University of Benin (Edo State), University of Port Harcourt (Rivers State), Ahmadu Bello University (Kaduna State), University of Maiduguri (Borno State), University of Calabar (Cross River State), and University of Ilorin (Kwara State). The nine treatment states that received new federal universities in 2011 are: Bayelsa, Ebonyi, Ekiti, Gombe, Jigawa, Katsina, Kogi, Nasarawa, and Taraba. This expansion aimed to address the geographic imbalance in access to federal tertiary education, as historical universities were concentrated in specific regions. All new universities began operations in the 2011/2012 academic session. Data source: Federal Ministry of Education administrative records.

Table 8: Urban-Rural Differences in University Establishment Effects

	Employment		Log Monthly Wage	
	Urban (1)	Rural (2)	Urban (3)	Rural (4)
DiD interaction (Treated $\times$ Post)	0.118*** ( 0.006)	-0.128*** ( 0.003)	1.192*** ( 0.037)	0.179* ( 0.097)
Observations	29215	74051	622	556
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	No	No
Controls	No	No	No	No
Clustered SE	Yes	Yes	Yes	Yes
Sample	Urban	Rural	Urban	Rural

Notes: Robust standard errors clustered at the state level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Columns (1)-(2) use the full sample split by urban/rural location, with employment as the dependent variable. Columns (3)-(4) restrict the sample to employed individuals split by urban/rural location, with log monthly wage as the dependent variable. All models include state and year fixed effects. Employment models also include survey wave fixed effects. Treatment is defined as states that received new federal universities in 2011. Post is defined as years 2013 and later, when students began enrolling at these new universities.

In Table 8 above, we show how the employment and wage impacts of the federal university expansion diverge significantly between urban and rural areas. In urban settings (Columns 1 and 3), the reform leads to a positive and statistically significant increase in both employment and wages. This suggests that urban areas are better positioned to leverage university-induced demand shocks, likely due to existing infrastructure, higher skill concentration, and more developed labor markets. The large wage effect in urban areas implies that university presence not only increases job availability but also uplifts labor productivity and compensation, consistent with agglomeration theories of regional development (Gennaioli et al., 2013; Moretti, 2004). In contrast, rural areas experience a negative employment effect and only a marginal wage increase. This discrepancy may reflect displacement effects, where rural workers migrate toward urban university towns, or a lack of local capacity to absorb new labor demand. It also underscores a key limitation of place-based policies: when complementary infrastructure and skills are lacking, benefits may bypass rural economies (Kline and Moretti, 2014; Scott, 2009).

To ensure that the main effects are not driven by outliers, In Table 9, we conduct placebo robustness tests by sequentially excluding individual treated states (Jigawa and Ekiti). The treatment effects remain unchanged, confirming that the employment gains are not driven by state-specific anomalies. This supports the internal validity of the causal claims and adheres to best practices in difference-in-differences design (Angrist and Pischke, 2009; Bertrand et al., 2004).

Finally, in Table 10, we probe deeper into how the new employment opportunities are distributed across sectors. Public sector employment declines sharply, suggesting either substitution toward other sectors or a reclassification of labor following university establishment. NGO/international sector employment rises, as does self-employment, both significant at the one percent level. This aligns with findings that universities attract development partners, donors, and entrepreneurial ventures, fostering local ecosystems beyond formal bureaucracies (Brekke, 2021; McCann and Ortega-Argilés, 2013; Chatterton and Goddard, 2000). The private sector effect is negligible, which may

Table 9: Placebo Tests: Leave-One-Out Robustness Checks

	Employment	
	Excluding	Excluding
	Jigawa (1)	Ekiti (2)
DiD interaction (Treated $\times$ Post)	0.279*** ( 0.004)	0.279*** ( 0.004)
Observations	2658	2755
State FE	Yes	Yes
Year FE	Yes	Yes
Controls	Yes	Yes
Clustered SE	Yes	Yes
Excluded State	Jigawa	Ekiti

Notes: Robust standard errors clustered at the state level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Each column represents the baseline model excluding one treated state to check for influential observations. The dependent variable is a comprehensive employment indicator. Column (1) excludes Jigawa state from the sample. Column (2) excludes Ekiti state from the sample. All models include state and year fixed effects and control for gender and urban location. Treatment is defined as states that received new federal universities in 2011. Post is defined as years 2013 and later, when students began enrolling at these new universities.

Table 10: Effects on Employment Sector Composition

	Employment Sectors (For Employed Individuals)			
	Public	Private	NGO/Int'l	Self-
	Sector (1)	Sector (2)	Sector (3)	Employed (4)
DiD interaction (Treated $\times$ Post)	-0.426*** ( 0.044)	-0.001 ( 0.001)	0.230*** ( 0.052)	0.128*** ( 0.029)
Observations	619	619	619	619
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the state level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . All models include state and year fixed effects and control for gender and urban location. The sample is restricted to employed individuals. The dependent variables are dummy variables for different employment sectors. Public sector includes government employees at all levels. Private sector includes employees of private companies. NGO/Int'l sector includes employees of non-governmental organizations, international organizations, and religious institutions. Self-employed includes individuals who work for themselves. Treatment is defined as states that received new federal universities in 2011. Post is defined as years 2013 and later, when students began enrolling at these new universities.

reflect the time lag between human capital investment and private sector absorption ([Duranton and Puga, 2001](#)). The emergence of self-employment and NGO opportunities indicates that higher education expansion can diversify local labor markets, but without parallel growth in stable public or private sector jobs, the quality and sustainability of these jobs remain a concern.