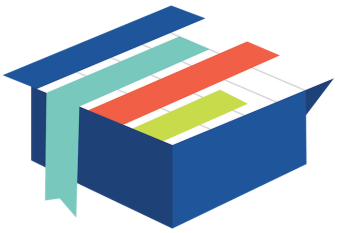

PSEO COALITION

COVID-19 and Early-Career Labor-Market Outcomes for Postsecondary Graduates: Evidence from Administrative Labor-Market Data

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Joseph Green and Arien Telles

This project was funded by a grant from the Postsecondary Employment Outcomes (PSEO) Coalition, made possible with support from Strada Education Foundation. The PSEO Coalition generates, analyzes, and shares employment data that demonstrates the value of higher education. The data are publicly available through a dashboard and downloadable dataset on the U.S. Census Bureau's website.

COVID-19 and Early-Career Labor-Market Outcomes for Postsecondary Graduates: Evidence from Administrative Labor-Market Data

Joseph Green and Arien Telles

Abstract: The COVID-19 pandemic generated an unprecedented disruption to the U.S. labor market, raising important questions about how macroeconomic shocks affect the transition from postsecondary education to employment. This study examines how the pandemic influenced early-career labor-market outcomes for postsecondary graduates using restricted-access administrative data from the Postsecondary Employment Outcomes (PSEO) dataset for the state of Texas. These data link institutional completion records to unemployment insurance wage records, enabling observation of graduate earnings, employment stability, industry placement, field-of-study alignment, and geographic mobility across pre-pandemic, disruption, and recovery cohorts.

Using cohort-level regression models with degree-level controls and field-of-study fixed effects, the analysis estimates how labor-market entry during the COVID-19 disruption affected graduate outcomes relative to pre-pandemic cohorts. Results indicate that graduates entering the labor market during the disruption experienced statistically significant short-term earnings penalties, earning approximately 2.2 percent less one year after graduation compared with pre-pandemic cohorts. Graduates entering during the early recovery period exhibited even larger short-term earnings gaps. In addition, disruption-period graduates demonstrated lower employment stability, increased field-of-study mismatch, and reduced interstate mobility. However, earnings differences diminish at longer horizons, suggesting partial recovery as workers accumulate labor-market experience. The findings highlight how large macroeconomic shocks can temporarily alter early-career labor-market trajectories and reshape the transition from postsecondary education to employment.

Keywords: Postsecondary education; labor-market entry; COVID-19 pandemic; administrative earnings data; field-of-study alignment; geographic mobility; PSEO; early-career outcomes.

INTRODUCTION

The COVID-19 pandemic generated one of the most abrupt shocks to the U.S. labor market in modern history, triggering rapid contractions in employment, sectoral shutdowns, and large-scale policy interventions (Huang, Makridis, Baker, & Medeiros, 2020; Cortes & Forsythe, 2023). Within weeks, hiring patterns, wage trajectories, and occupational demand shifted in ways that reshaped early-career opportunities for new labor-market entrants (Autor & Reynolds, 2020; Cajner, et al., 2020). Although the macroeconomic consequences of the pandemic have been widely documented, far less is known about how these disruptions affected the labor-market trajectories of recent postsecondary graduates, a group historically vulnerable to scarring during downturns (Kahn, 2010; Oreopoulos, von Wachter, & Heisz, 2012).

Understanding these dynamics is central to evaluating the economic returns to higher education. Postsecondary credentials are justified in part by their labor-market payoff, yet large shocks can alter both the magnitude and distribution of these returns (Carnevale, Cheah, & Hanson, 2020). Existing evidence on downturn entry effects relies heavily on survey data or short observation windows, limiting the ability to distinguish temporary disruptions from persistent changes in earnings, job stability, or occupational alignment (von Wachter, 2020; Altonji, Kahn, & Speer, Cashier or consultant? Entry labor market conditions, field of study, and career success, 2016).

Recent quasi-experimental evidence shows that COVID-19 illness produced persistent reductions in labor supply, even among prime-age workers, highlighting the long-run consequences of pandemic-related shocks (Soltas & Goda, 2022). In addition

to high-frequency administrative data reveal that the pandemic generated sharply divergent employment trajectories across income groups, with low-wage workers experiencing deep and persistent job losses even after aggregate spending recovered (Chetty, Friedman, Stepner, & the Opportunity Insights Team, 2024). These studies provide important insights but do not offer a comprehensive account of how graduates' employment, earnings, field-of-study alignment, and geographic mobility evolved across the pre-pandemic, disruption, and recovery periods.

This study addresses these gaps by examining graduate labor-market outcomes using restricted-access Postsecondary Employment Outcomes (PSEO) administrative data for the state of Texas covering the period 2018–2024 (Library, Learn & Work Ecosystem, 2026). The PSEO data link postsecondary completion records to unemployment insurance wage records, providing detailed measures of graduate earnings, employment stability, industry placement, field-of-study alignment, and geographic mobility (McNeely & Pisacreta, 2025). Using cohort-level comparisons across pre-pandemic, disruption, and recovery periods, we estimate how labor-market entry during the COVID-19 pandemic affected early-career outcomes and whether these effects persisted during the recovery (Schwandt & Von Wachter, 2019).

Our analysis proceeds in three steps. First, we document pre-pandemic trends in graduate employment and earnings, establishing baseline trajectories across degree levels, majors, and institutional sectors. Second, we estimate the magnitude of COVID-period disruptions through cohort-level panel models with fixed effects to examine variation in labor-market outcomes. Third, we examine heterogeneity in

disruption and recovery dynamics across the earnings distribution, fields of study, and public versus private institutions, as well as changes in geographic mobility and instate retention.

We address the following research questions:

1. How did employment and earnings outcomes for recent graduates change during the COVID-19 disruption relative to pre-pandemic trends?
2. To what extent did industry placement and job stability shift across disruption and recovery periods?
3. Did field-of-study alignment deteriorate, and were mismatch effects concentrated in majors or sectors?
4. How did geographic mobility and instate retention evolve, especially for graduates of public institutions?
5. Were pandemic-era effects concentrated within specific earnings distributions, degree levels, or institutional sectors?

This study contributes to literature in three ways. First, it provides one of the first longitudinal analyses of how the COVID-19 pandemic reshaped early-career labor-market outcomes for postsecondary graduates using administrative earnings data. Second, by integrating measures of earnings, field-of-study alignment, and geographic mobility, the analysis provides a more comprehensive view of the economic value of postsecondary education during a period of systemic labor-market disruption. Third, the study examines not only the immediate disruption associated with the pandemic but also the extent to which labor-market outcomes recovered in

the years following the crisis. By examining both disruption and recovery dynamics, the analysis offers new insight into the resilience of postsecondary labor-market returns under conditions of macroeconomic uncertainty.

By integrating longitudinal administrative data with econometric methods suited to analyzing large structural shocks, this study provides new evidence on how the pandemic reshaped early-career labor-market outcomes (Aji & Akbardin, 2024). High-frequency administrative research demonstrates that COVID-19 generated sharp, heterogeneous disruptions across sectors and income groups, underscoring the importance of granular data for understanding labor-market adjustment (Chetty, Friedman, Stepner, & the Opportunity Insights Team, 2024). Beyond documenting disruption, the analysis illuminates recovery dynamics, workforce alignment, and the resilience of postsecondary labor-market returns under conditions of systemic uncertainty, consistent with broader evidence on the pandemic's unprecedented labor-market shock (Autor & Reynolds, 2020).

Theoretical Framework: Pandemic Labor-Market Disruption and Early-Career Outcomes

Understanding how the COVID-19 pandemic affected early-career labor-market outcomes requires linking macroeconomic shocks to individual labor-market trajectories. This study conceptualizes the pandemic as an exogenous macroeconomic shock that disrupted labor demand, altered industry hiring patterns, and reshaped the matching process between graduates and employers. Because the pandemic originated outside the labor market and affected nearly all sectors simultaneously, it

provides a natural setting for examining how large-scale economic disruptions influence the transition from education to employment.

Economic theory suggests that labor-market entry conditions play a critical role in shaping long-term career trajectories. Graduating during economic downturns can produce persistent effects on earnings, employment stability, and occupational mobility, a phenomenon often referred to as labor-market scarring (Kahn, 2010; Oreopoulos, von Wachter, & Heisz, 2012). These effects arise because workers entering weak labor markets are more likely to accept lower-quality job matches, experience slower wage growth, and accumulate less relevant work experience early in their careers (Bellou & Kaymak, 2021).

The COVID-19 pandemic created conditions likely to amplify these scarring effects due to the abrupt and uneven shutdown of major economic sectors (Autor & Reynolds, 2020). Industries such as hospitality, retail, and travel experienced sharp contractions, while sectors including technology, logistics, and healthcare expanded rapidly. These shifts altered the availability and distribution of employment opportunities available to new graduates (Autor & Reynolds, 2020; Cajner, et al., 2020).

Within this framework, pandemic disruptions influence graduate labor-market outcomes through several mechanisms (Brinca, Duarte, & Faria-e-Castro, 2021). First, the pandemic generated a labor demand shock across many sectors of the economy (Brinca, Duarte, & Faria-e-Castro, 2021; del Rio-Chanona, Mealy, & Pichler, 2020). Hiring freezes, layoffs, and reductions in firm activity constrained job opportunities for new

labor-market entrants, particularly during the early stages of the crisis (Brune, Chyn, & Kerwin, 2021).

Second, the pandemic triggered sectoral reallocation in which labor demand shifted across industries in response to changing economic conditions (Consolo & Petroulakis, 2024; Ferrante, Graves, & Iacoviello, 2023). As some industries contracted and others expanded, graduates may have accepted employment outside their intended career paths or fields of study (Quinlan & Renninger, 2022; Guerrieri, Lorenzoni, Straub, & Werning, 2022).

Third, pandemic conditions increased job matching frictions between workers and employers (Lastauskas, 2022). Reduced hiring activity and uncertainty about future economic conditions may have increased the likelihood that graduates accepted temporary or lower-quality job matches (Pollio, Landini, Prodi, & Arrighetti, 2025) (Rouvroye, van Dalen, Henkens, & Schippers, 2022). These mismatches may persist if early employment experiences shape subsequent career trajectories (Rouvroye, van Dalen, Henkens, & Schippers, 2022).

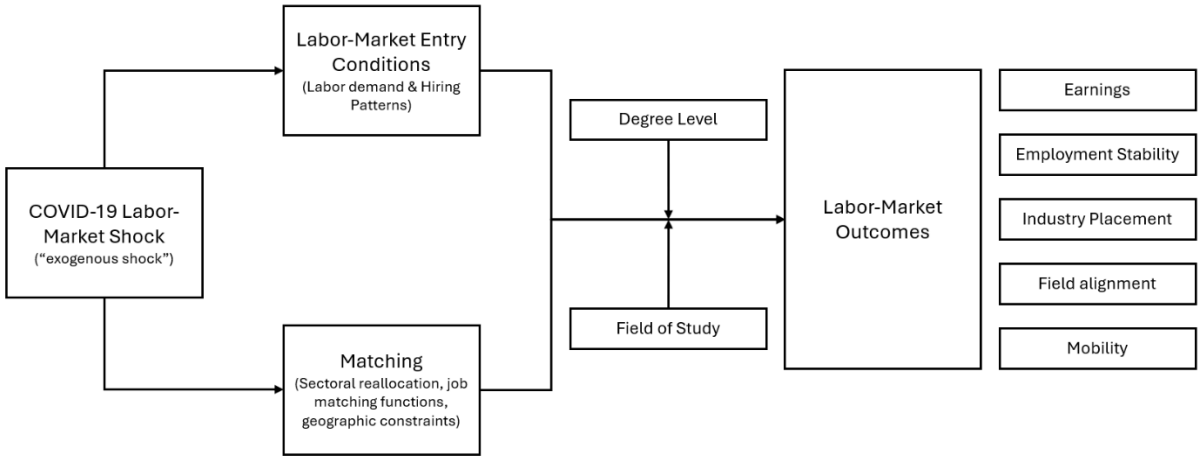
Fourth, the pandemic altered patterns of geographic mobility (Maza & Hierro, 2022). Lockdowns, travel restrictions, and the expansion of remote work may have constrained the ability of graduates to relocate for employment, potentially increasing in-state employment and reducing interstate migration (Kajitani, Yamano, & Chang, 2023; Choudhury, 2022). Evidence from the United States suggests that COVID-19 mobility restrictions significantly reduced interstate and long-distance movement,

further limiting relocation opportunities during the disruption period (Zhou, et al., 2020).

These mechanisms collectively influence observable labor-market outcomes captured in the PSEO data, including earnings trajectories, employment stability, industry placement, field-of-study alignment, and geographic mobility. By examining these outcomes across pre-pandemic, disruption, and recovery periods, the study evaluates how the pandemic reshaped early-career labor-market trajectories for recent graduates.

Figure 1 presents the conceptual framework guiding the analysis. The model conceptualizes the COVID-19 pandemic as a large exogenous macroeconomic disruption that altered labor-market entry conditions, affecting early-career outcomes through changes in labor demand, sectoral hiring patterns, job-matching frictions, and geographic mobility constraints.

Figure 1: Conceptual Framework: COVID-19 Labor Market Shock and Early-Career Outcomes



Together, these mechanisms suggest that the COVID-19 pandemic disrupted the transition from postsecondary education to employment through multiple channels, including reduced labor demand, sectoral reallocation, increased job matching frictions, and constraints on geographic mobility. These disruptions are expected to affect observable labor-market outcomes such as earnings trajectories, employment stability, industry placement, and geographic mobility.

Literature Review

Pandemic Disruption and Earnings

Research consistently highlights that the timing of labor market entry plays a pivotal role in determining long-term career outcomes (Arellano-Bover, 2022; Ilyés & Sebők, 2023). Economic downturns at the time of entry result in persistent wage penalties, often referred to as "scarring effects," due to several interrelated factors (Tomlinson & Tholen, 2023; Eguia, Rodriguez Gonzalez, & Serrano, 2023). Graduates

entering during such downturns encounter reduced job opportunities, leading them to accept lower-quality job matches which, in turn, offer less optimal career growth opportunities and slowed wage progression (Kahn, 2010; Oreopoulos, von Wachter, & Heisz, 2012).

Unlike typical recessions, the COVID-19 pandemic induced unprecedented economic and social disruptions (Tomlinson & Tholen, 2023). These disruptions were characterized not just by economic contraction, but by sector-specific shutdowns, remote working arrangements, and rapid technological adoption (Akinwande, Boustras, Akhagba, & Benson, 2025). Such unique conditions further altered traditional pathways of career entry, potentially exacerbating initial earnings disadvantages (Tomlinson & Tholen, 2023; Vogtenhuber, Steiber, & Mühlböck, 2024). The abrupt transition to remote work environments and digital platforms may have further disadvantaged those entering the job market without prior experience, as networking opportunities and informal training typically facilitating early-career progression were severely limited (Bartik, Bertrand, Lin, Rothstein, & Unrath, 2020).

The pandemic's impact on labor demand varied significantly across industries, intensifying the unpredictability of job placements for new graduates (Tomlinson & Tholen, 2023). While industries such as healthcare and technology saw spikes in demand, others like hospitality and retail faced contractions, pushing new graduates toward less desirable roles inconsistent with their skills and educational background (Tiwari & Shah, 2026; Liu-Lastres, Wen, & Huang, 2023). Additionally, the heightened competition for available positions likely forced many to accept interim employment

outside their desired fields, potentially delaying their career development trajectory (Tomlinson & Tholen, 2023).

Accordingly, the following hypothesis is proposed:

> **H1:** *Graduates entering the labor market during the COVID-19 disruption period experience lower early-career earnings relative to graduates entering the labor market in the pre-pandemic period.*

Employment Stability

The COVID-19 pandemic induced one of the most profound labor market shocks in recent history, resulting in massive employment declines across numerous sectors. According to the U.S. Bureau of Labor Statistics (2021), certain industries, including hospitality, retail, and tourism, witnessed significant job cuts, exacerbating the challenges for individuals, particularly new graduates, attempting to secure stable employment during this time.

Research consistently demonstrates that labor market conditions at the time of entry can greatly influence long-term career trajectories. Studies by Kahn (2010) and Oreopoulos, von Wachter, and Heisz (2012) detail how starting careers during recessions or economic downturns can lead to "scarring effects" that persist over time (Eguia, Rodriguez Gonzalez, & Serrano, 2023). These scarring mechanisms arise in part because new graduates are more likely to accept lower-quality or mismatched jobs when labor demand is weak, with consequences that persist well beyond the initial

downturn (Schwandt & Von Wachter, 2019; Altonji, Kahn, & Speer, Cashier or consultant? Entry labor market conditions, field of study, and career success, 2016).

Unlike past economic downturns, the COVID-19 pandemic also accelerated sectoral reallocation and shifts in labor demand, which further complicated the employment landscape for new entrants (Barrero, Bloom, & Davis, Why working from home will stick, 2021; Forsythe, Kahn, Lange, & Wiczer, 2022). Industries like healthcare and technology saw spikes in demand, whereas sectors reliant on in-person interaction experienced prolonged stagnation, leaving new graduates with fewer stable entry-level positions (Bartik, Bertrand, Lin, Rothstein, & Unrath, 2020).

Economists argue that weak labor markets compel new entrants to accept temporary, less stable roles, sacrificing potential career advancement and job security (the "scar model") (Tomlinson & Tholen, 2023). This paradigm suggests that entering the workforce during the pandemic would likely yield similar outcomes, with graduates facing higher risks of intermittent unemployment and constrained job mobility (Tanzi, 2022).

Policymakers have responded to pandemic-induced employment instability with interventions such as stimulus packages and unemployment benefits, aiming to buffer short-term impacts (Chetty, Friedman, Stepner, & the Opportunity Insights Team, 2024; Ganong, Noel, & Vavra, 2020) . However, long-term monitoring and structural support remain critical in mitigating the adverse effects on early-career professionals' employment trajectories (Jackson & Ortego-Marti, 2024).

Based on these insights, the following hypothesis is posited:

> **H2:** *Graduates entering the labor market during the COVID-19 disruption period experience lower employment stability relative to pre-pandemic graduates.*

Industry Placement

Industry-specific labor demand shocks during the pandemic likely altered the distribution of employment opportunities available to new graduates. U.S. Bureau of Labor Statistics (2021) data indicate that during COVID-19, sectors such as healthcare, transportation, and information technology expanded rapidly in response to the increased demand for essential services, digital infrastructure, and logistical support. In contrast, industries that were heavily reliant on in-person interactions, including leisure and hospitality, the arts and entertainment, and retail, contracted sharply due to lockdowns, social distancing, and decreased consumer activity (del Rio-Chanona, Mealy, & Pichler, 2020). These uneven sectoral shifts created a highly dynamic labor market where the availability of jobs varied widely by industry (del Rio-Chanona, Mealy, & Pichler, 2020).

Graduates entering the labor market during this period may have been forced to adjust their career plans, as many found themselves accepting positions outside of their intended fields (Kahn, 2010; Gottschalk & Hansen, 2003). This misalignment reflects a broader pattern of labor market mismatch during the pandemic, highlighting the challenges that recent college graduates faced while navigating job opportunities during unprecedented economic disruption (del Rio-Chanona, Mealy, & Pichler, 2020).

Accordingly, the following hypothesis is proposed:

> **H3:** *Graduates entering the labor market during the COVID-19 disruption period are less likely to obtain employment in industries aligned with their expected career paths relative to pre-pandemic graduates.*

Field-of-Study Alignment

Field-of-study alignment, often conceptualized as job, education match or horizontal mismatch, captures the extent to which workers are employed in occupations or industries that correspond to their academic major or training (Robst, 2007). A substantial literature shows that working outside one's field of study is associated with lower wages, reduced job satisfaction, and weaker returns to education, even after controlling other factors (Allen & van der Velden, 2001; Schnell & Gramm, 1987). Economic downturns tend to increase the incidence of such mismatches, as graduates accept positions outside their field due to limited opportunities in their preferred domains (Oreopoulos, von Wachter, & Heisz, 2012).

The mechanisms linking downturns to field-of-study misalignment are closely related to scarring and mismatch theories (McVicar & McGuinness, 2006). When labor demand in a graduate's target field is weak, they are more likely to accept jobs that underutilize their specialized skills or are only tangentially related to their training (Kahn, 2010). These initial mismatches can persist if early career experiences shape subsequent job offers, professional networks, and perceived comparative advantage, thereby influencing long-term occupational trajectories (Altonji, Kahn, & Speer, Cashier

or consultant? Entry labor market conditions, field of study, and career success, 2016). In this sense, field-of-study misalignment is both a symptom of constrained opportunity at entry and a potential channel through which long-run penalties emerge (Kahn, 2010).

The COVID-19 pandemic amplified these dynamics by simultaneously disrupting specific industries and altering hiring practices (del Rio-Chanona, Mealy, & Pichler, 2020). Sectors closely tied to certain fields of study (e.g., hospitality and tourism, performing arts, some service-oriented business fields) experienced prolonged contractions, while others (e.g., health sciences, information systems) expanded (Raimo, Martínez-Córdoba, Benito, & Vitolla, 2021; del Rio-Chanona, Mealy, & Pichler, 2020). Graduates from adversely affected fields faced a higher likelihood of accepting jobs outside their major, either in unrelated industries or in generic roles that did not leverage their specialized training (Monteiro, Straume, & Valente, 2021). Remote hiring and the reduction of internships and experiential learning opportunities may have further weakened the signaling value of field-specific skills for some cohorts (Hora, Chen, Parrott, & Her, 2021).

Given this context, field-of-study alignment becomes a critical indicator of how effectively the labor market absorbs graduates' human capital during crisis conditions (Robst, 2007). Lower alignment for pandemic-era entrants would be consistent with broader evidence on mismatch and scarring and would help explain observed differences in earnings and employment stability across cohorts (Kahn, 2010).

Economic downturns can increase the likelihood of job mismatch when graduates accept positions outside their field of training due to limited employment opportunities (Rumberger, 1987). These mismatches may persist if early career experiences shape future career trajectories.

Accordingly, the following hypothesis is articulated:

> **H4:** *Graduates entering the labor market during the COVID-19 disruption period experience lower field-of-study alignment between their academic major and industry of employment relative to pre-pandemic graduates.*

Geographic Mobility

The pandemic significantly disrupted geographic mobility through travel restrictions, stay-at-home orders, remote work arrangements, and uneven regional labor-market conditions, severely limiting mobility and interrupting both short- and long-distance relocation across the United States (Haslag & Weagley, 2024; Chetty, Friedman, Stepner, & the Opportunity Insights Team, 2024). National evidence also documents sustained declines in human mobility throughout the COVID-19 period, suggesting reduced willingness and ability to relocate across geographic regions during this period (Elarde, et al., 2021). These constraints interrupted typical career-related relocation and reduced the opportunities graduates had to consider geographic relocation.

During this time, the rapid expansion of remote work altered the traditional relationship between employment and geographic proximity to work, reducing the

need for workers to relocate near physical job sites (Monte et al., 2023). This decoupling of work and location reshaped migration incentives, urban labor-market participation, and residential decisions during the pandemic period (Delventhal, Kwon, & Parkhomenko, 2022). The expansion of work-from-home arrangements further weakened the connection between job location and residence, allowing workers greater geographic flexibility while simultaneously reducing relocation driven by traditional commuting requirements (Barrero, Bloom, & Davis, 2023).

Based on these insights, the following hypothesis is proposed:

> **H5:** *Graduates entering the labor market during the COVID-19 disruption period are less likely to relocate across state lines for employment relative to pre-pandemic graduates.*

Recovery Dynamics

While the COVID-19 pandemic generated immediate and severe labor market disruptions, the extent to which these effects persisted into the recovery period remains an open empirical question (Bussink, Vervliet, & ter Weel, 2022). Early evidence suggests that labor markets experienced a rapid rebound in aggregate employment and job openings following the initial shock; however, recovery trajectories have been highly uneven across sectors, occupations, and worker cohorts (Barrero, Bloom, & Davis, Why working from home will stick, 2021). This heterogeneity reflects differences in exposure to pandemic-related restrictions, the feasibility of remote work, and the pace at which demand returned in contact-intensive industries (Barrero, Bloom, &

Davis, Why working from home will stick, 2021; del Rio-Chanona, Mealy, & Pichler, 2020). Persistent changes in remote-work adoption also reshaped labor-market recovery and geographic job access, particularly in occupations with higher remote feasibility (Barrero, Bloom, & Davis, 2023).

A growing body of research further suggests that, even as headline labor market indicators improved, underlying frictions in job matching and skill utilization may have persisted (Barrero, Bloom, & Davis, Why working from home will stick, 2021; Forsythe, Kahn, Lange, & Wiczer, 2022). Sectors that experienced prolonged contraction, such as leisure, hospitality, and certain service industries, recovered more slowly, limiting opportunities for graduates whose fields of study are closely tied to these industries (Cajner, et al., 2020). At the same time, expansion in other sectors (e.g., technology and health-related fields) may not have fully absorbed displaced workers due to differences in required skills and credentials, contributing to continued mismatch during the recovery phase (del Rio-Chanona, Mealy, & Pichler, 2020). Broader evidence also suggests that constrained labor-market opportunities during COVID-19 affected graduate transitions more broadly, including reduced post-graduation employment flexibility and mobility across student populations, even though these effects were especially pronounced among international graduates (Mihut, Altbach, & de Wit, 2025).

Importantly, prior research on economic downturns indicates that initial labor market conditions at entry can have lasting consequences, even after macroeconomic recovery (Kahn, 2010). Graduates entering the labor market during recessions often experience persistent earnings losses, slower career progression, and prolonged

periods of mismatch, suggesting that short-term disruptions can translate into long-term scarring effects (Kahn, 2010; Oreopoulos, von Wachter, & Heisz, 2012). Similarly, evidence on job displacement and early-career shocks demonstrates that workers affected by adverse labor market conditions may face enduring instability in earnings and employment trajectories (von Wachter, 2020).

Taken together, these findings suggest that while some labor market outcomes may normalize relatively quickly during recovery, others, particularly those related to job match quality and field-of-study alignment, may exhibit more persistent effects (Kahn, 2010; Montt, 2017). This raises the possibility that pandemic-era graduates could experience a bifurcated recovery, in which aggregate employment indicators improve, but underlying mismatches and cohort-specific disadvantages endure (Barrero, Bloom, & Davis, Why working from home will stick, 2021).

> **H6:** *Labor-market outcomes for graduates entering during the pandemic partially recover during the post-pandemic period, but early-career earnings and employment trajectories remain below pre-pandemic trends.*

Heterogeneity in Pandemic Effects

Labor-market disruptions may not affect all graduates equally (Cajner, et al., 2020). Differences in field of study, institutional sector, and degree level may influence the degree to which graduates are exposed to pandemic-related labor-market shocks (Dingel & Neiman, 2020). Early evidence from the COVID-19 period highlights substantial heterogeneity in employment losses and recovery trajectories across

industries and occupations, reflecting variation in the ability to perform work remotely and differences in exposure to demand shocks (Cajner, et al., 2020; del Rio-Chanona, Mealy, & Pichler, 2020). As a result, graduates entering fields closely tied to contact-intensive industries, such as hospitality, tourism, and the arts, faced greater initial displacement and slower recovery relative to those in fields aligned with remote-capable or essential sectors (Dingel & Neiman, 2020).

Field of study is a central dimension of this heterogeneity, as it shapes both the set of occupations available to graduates and their vulnerability to sector-specific shocks (Altonji, Blom, & Meghir, 2012). Research on task composition and remote work feasibility demonstrates that occupations differ substantially in their susceptibility to disruption, with jobs requiring in-person interaction experiencing sharper declines during the pandemic (Dingel & Neiman, 2020). Consequently, graduates in fields linked to non-remote occupations may have faced more limited employment opportunities and a higher likelihood of accepting positions outside their intended career paths, contributing to increased field-of-study mismatch (Dingel & Neiman, 2020; Kahn, 2010; Montt, 2017).

Institutional sector may further moderate pandemic effects. Graduates from different types of institutions (e.g., public vs. private, selective vs. less selective) often have access to distinct labor market networks, employer pipelines, and signaling mechanisms, which can influence resilience during economic shocks. Prior research suggests that institutional quality and selectivity are associated with differential labor market outcomes, including earnings trajectories and job match quality, particularly

during periods of economic uncertainty (Oreopoulos, von Wachter, & Heisz, 2012). These differences may have been amplified during the pandemic, as employers relied more heavily on observable signals when screening candidates in a constrained hiring environment.

Degree level also plays an important role in shaping exposure to labor market disruption (Dingel & Neiman, 2020; Autor & Reynolds, 2020). Workers with higher levels of education are more likely to be employed in occupations that can be performed remotely and are therefore less vulnerable to short-term employment shocks (Dingel & Neiman, 2020). At the same time, lower-degree holders may be disproportionately concentrated in service-sector roles that were heavily affected by pandemic-related restrictions, leading to greater employment instability and slower recovery (Cajner, et al., 2020).

Taken together, these findings suggest that pandemic-related labor market disruptions are highly heterogeneous, with outcomes varying systematically across fields of study, institutional characteristics, and degree levels (Cajner, et al., 2020; Altonji, Blom, & Meghir, 2012). This heterogeneity has important implications for understanding differences in field-of-study alignment, earnings trajectories, and employment stability across cohorts entering the labor market during the pandemic period (Kahn, 2010; Montt, 2017).

> **H7:** *Pandemic labor-market disruptions vary across fields of study, degree levels, and institutional sectors, with some groups experiencing larger earnings and employment shocks than others.*

METHODS

Data and Sample Construction

This study uses restricted-access data from the Postsecondary Employment Outcomes (PSEO) dataset for the state of Texas, which links postsecondary completion records to administrative employment and earnings derived from Texas state unemployment insurance (UI) wage records. The dataset provides aggregated labor-market outcomes for graduates of participating institutions, including median earnings, employment rates, and industry placement by field of study and degree level.

The analytic sample includes graduates from participating institutions in Texas between 2018 and 2024, spanning the pre-pandemic baseline (2018-2019), the COVID-19 labor-market disruption (2020-2021), and the early recovery period (2022–2024). Restricting the analysis to cohorts observed within this window allows the study to compare labor-market outcomes across pre-pandemic, disruption, and recovery cohorts.

The unit of observation in the primary analysis is a cohort–field–degree cell, defined by graduation cohort, field of study (Classification of Instructional Programs; CIP), degree level, and post-graduation horizon. These aggregated outcome measures are derived from Texas unemployment insurance administrative wage records and allow comparison of earnings and employment outcomes across labor-market entry cohorts.

To ensure comparability across cohorts, the analysis focuses on programs with consistent reporting across the observation period and excludes observations with missing earnings information or incomplete program identifiers. The resulting dataset provides a structured view of graduate labor-market outcomes within the Texas labor market during the pandemic disruption and recovery periods.

Outcome Measures

The study examines several dimensions of early-career labor-market outcomes derived from the PSEO administrative records for Texas graduates.

Earnings

The primary economic outcome is median earnings at specified post-graduation horizons, derived from Texas unemployment insurance wage records. Earnings are expressed in logarithmic form in regression models to reduce the influence of extreme values and allow interpretation of coefficients as approximate percentage changes.

Employment

Employment status is measured using a binary indicator equal to one if a graduate reports positive UI earnings in each quarter and zero otherwise. This measure captures labor-market participation within Texas unemployment insurance-covered employment sectors.

Industry Placement

Industry placement is measured using the North American Industry Classification System (NAICS) codes associated with employers. These codes allow identification of the industry sector in which graduates are employed, enabling analysis of shifts in sectoral placement during the pandemic disruption within the Texas labor market.

Field-of-Study Alignment

Field-of-study alignment is approximated by linking graduates' Classification of Instructional Programs (CIP) codes to employer industry sectors. Alignment indicators are constructed by identifying whether the industry of employment corresponds to sectors typically associated with a graduate's field of study.

Geographic Mobility

Geographic mobility is measured by comparing the state of employment recorded in the wage records with the state of the degree-granting institution. An indicator variable identifies whether graduates remain employed in-state or relocate to another state following graduation based on employment records observed in Texas UI wage data.

Baseline Descriptive Analysis

Prior to estimating empirical relationships across labor-market entry cohorts, the analysis presents descriptive statistics comparing labor-market outcomes across pre-pandemic, disruption, and recovery periods. Following standard practice in applied

microeconomics, baseline means and distributions of key outcomes are compared across cohorts using two-sample t-tests and distributional comparisons.

These descriptive analyses establish baseline labor-market trajectories prior to the pandemic and provide initial evidence of shifts in earnings, employment rates, and industry placement during the disruption period.

Empirical Strategy

To estimate associations between pandemic-era labor-market entry and graduate outcomes, the study employs cohort-level regression models that compare labor-market outcomes across pre-pandemic, disruption, and recovery cohorts.

The baseline specification is:

$$ln\left(Y_{\{cdf\}}\right) = \beta_1 Disruption_c + \beta_2 Recovery_c + \gamma Degree_d + \alpha_f + \epsilon_{\{cdf\}}$$

where:

- Y_{cdf} represents the labor-market outcome (e.g., median earnings) for graduation cohort c, degree level d, and field of study f;
- $Disruption_c$ is an indicator for graduates entering the labor market during the pandemic disruption period (2020–2021);
- $Recovery_c$ indicates graduates entering during the early recovery period (2022–2024);
- $Degree_d$ represents indicators for degree level;
- α_f represents field-of-study fixed effects based on CIP codes;
- ϵ_{cdf} is the error term.

This specification estimates differences in labor-market outcomes for disruption and recovery cohorts relative to the pre-pandemic baseline while controlling for systematic

differences across degree levels and fields of study. Because earnings are expressed in logarithmic form, estimated coefficients can be interpreted as approximate percentage differences relative to the pre-pandemic baseline.

Heterogeneity Analysis

To examine whether pandemic-era labor-market disruptions affected graduates unevenly, the analysis estimates extended specifications interacting the pandemic indicators with key graduate characteristics.

These interactions allow the study to evaluate differential impacts across:

- degree levels (certificate, associate, bachelor's, graduate degrees)
- fields of study
- institutional sectors (public vs. private institutions)
- earnings distribution groups

These models help determine whether pandemic disruptions disproportionately affect certain educational pathways or segments of the graduate labor market.

Estimation and Inference

All regression models are estimated using ordinary least squares (OLS). Standard errors are clustered at the field-of-study (CIP) level to account for within-discipline correlation in labor-market outcomes and potential dependence across cohort-field observations. For earnings outcomes, the dependent variable is the natural logarithm of median earnings, allowing estimated coefficients to be interpreted as approximate percentage differences across cohorts. Robustness checks using alternative earnings

specifications were conducted to assess sensitivity to model specification and extreme values in the earnings distribution.

For earnings outcomes, the dependent variable is the natural logarithm of median earnings, allowing estimated coefficients to be interpreted as approximate percentage differences across cohorts. Robustness checks using alternative earnings specifications were conducted to ensure that results are not driven by extreme values in the earnings distribution. Because the PSEO data relies on Texas unemployment insurance wage records, the observed employment and earnings outcomes primarily reflect labor-market activity occurring within Texas.

Robustness and Sensitivity

To assess the robustness of the estimated pandemic-era effects, a series of sensitivity analyses were conducted. These analyses evaluate whether the results are sensitive to alternative outcome definitions, cohort classifications, model specifications, and sample restrictions. All robustness models retain the same degree-level controls and field-of-study fixed effects used in the primary specifications, with standard errors clustered at the field-of-study level.

RESULTS

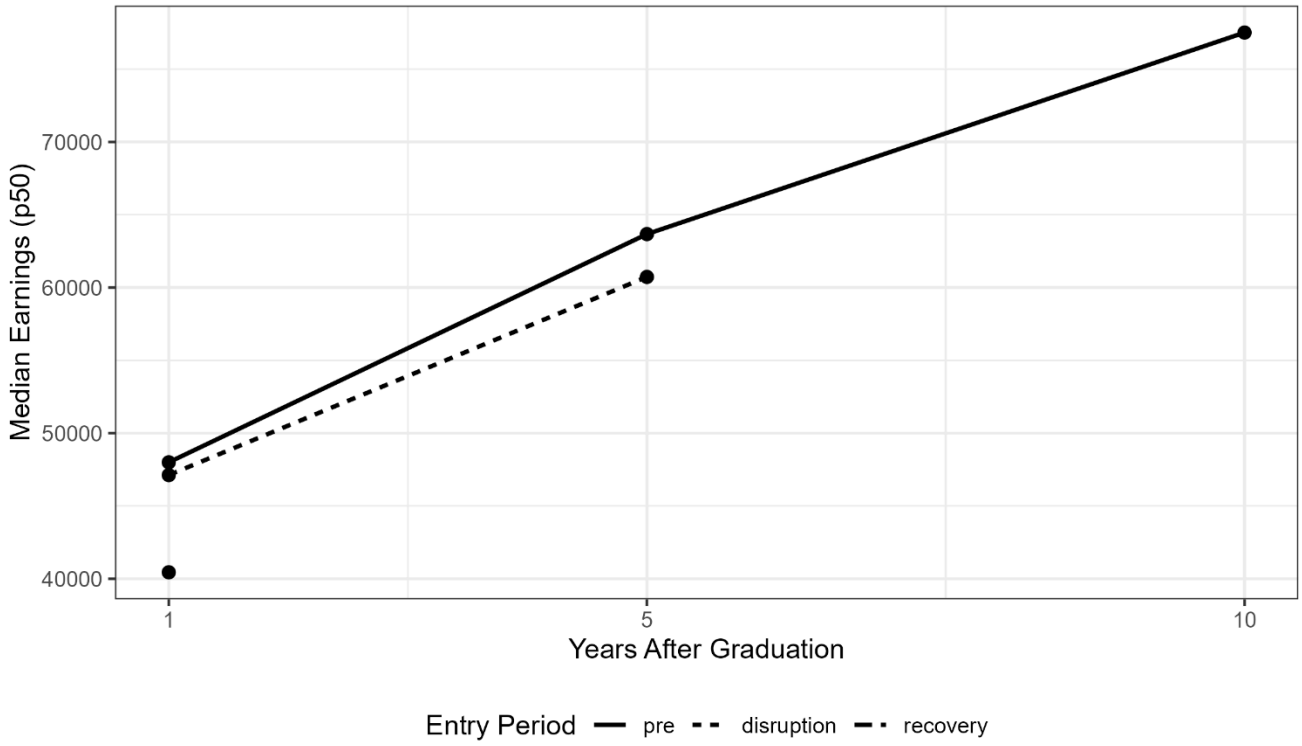
Descriptive Statistics

Descriptive analyses provide an overview of labor-market outcomes across cohorts, degree levels, and experience horizons for graduates observed in the Texas PSEO dataset. Across the full sample, median earnings increase with experience

following graduation, consistent with expected early-career wage growth trajectories. Graduates holding higher degree levels exhibit substantially higher median earnings across all horizons, with master's, doctoral, and professional degrees associated with the largest earnings differentials relative to lower award levels.

Figure 1 displays median earnings trajectories by labor-market entry period across post-graduation horizons for graduates in the Texas labor market.

Figure 2: Median Earnings Trajectories by Labor-Market Entry Period



Labor-market outcomes also vary by graduation cohort. Graduates entering the labor market prior to the COVID-19 pandemic display relatively stable earnings trajectories. In contrast, cohorts entering during the pandemic disruption period show

weaker early-career outcomes. Descriptive patterns are consistent with an entry-cohort shock during the disruption and early recovery periods (see Figure 1).

Industry distribution patterns also indicate variation in employment placement across cohorts. Some graduates entered industries outside their expected career pathways, suggesting that pandemic labor-market conditions disrupted the matching process between educational training and available employment opportunities within the Texas labor market.

Together, these descriptive trends suggest that early-career outcomes depend both on individual characteristics such as degree level and on macroeconomic conditions at labor-market entry.

Pandemic Disruption Effects on Earnings (H1)

Hypothesis 1 predicted that graduates entering the labor market during the COVID-19 disruption period would experience lower early-career earnings relative to pre-pandemic graduates. Table 1 reports regression estimates of pandemic entry-period effects on earnings (ln p50), controlling for degree level and field-of-study fixed effects with standard errors clustered by field of study (CIP) using administrative earnings data from the Texas PSEO dataset.

Table 1: Pandemic Disruption and Recovery Effects on Earnings (ln p50)

Horizon	Disruption vs. Pre (%)	Recovery vs. Pre (%)	p-value (Disruption vs. Pre)	p-value (Recovery vs. Pre)
Y1	-2.2%*	-5.8%***	0.013	<0.001
Y5	-1.4%	-	0.187	-

Notes: Estimates represent percentage changes relative to the pre-pandemic baseline. Statistical significance levels are denoted as follows: *p < 0.05, **p < 0.01, ***p < 0.001. A dash (-) indicates that the estimate is not applicable or not estimated for that horizon.

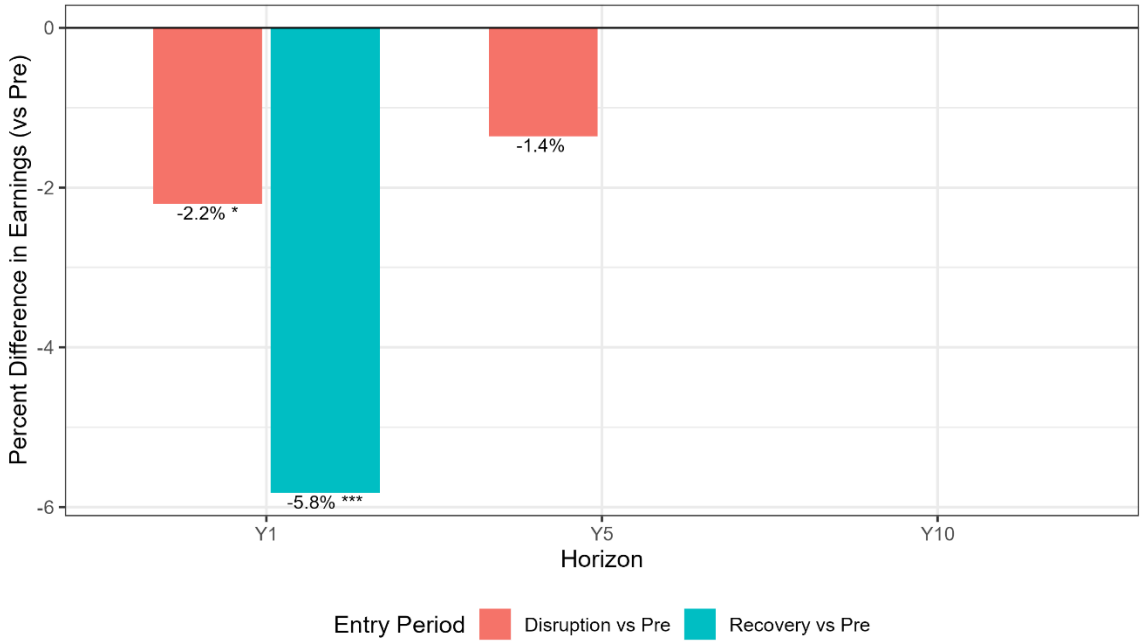
Regression results support this hypothesis for the earliest career stage. Controlling for degree level and field-of-study fixed effects, graduates entering the labor market during the pandemic disruption period earn 2.2 percent lower median earnings one year after graduation compared with pre-pandemic cohorts (p = .013) within the Texas labor market.

In addition, graduates entering during the early recovery period also experience reduced early-career earnings. The recovery cohort earns 5.8 percent lower median earnings at the one-year horizon relative to pre-pandemic cohorts (p < .001). Figure 2 visualizes the estimated earnings differences across disruption and recovery cohorts relative to pre-pandemic graduates.

At the five-year horizon, the estimated disruption effect declines to −1.4 percent and is not statistically significant (p = .187), suggesting that early-career earnings penalties may diminish as graduates accumulate labor-market experience.

Overall, Hypothesis 1 is supported at the one-year horizon, indicating that pandemic-era labor-market entry reduced initial earnings trajectories.

Figure 3: Estimated Earnings Penalty by Labor-Market Entry Period



Employment Stability (H2)

Hypothesis 2 predicted that graduates entering the labor market during the COVID-19 disruption period would experience lower employment stability relative to pre-pandemic graduates.

Analyses of employment rates indicate modest declines in employment stability for disruption-period cohorts in the Texas PSEO data. Graduates entering the labor market during the pandemic exhibit lower employment probabilities during the early post-graduation period relative to pre-pandemic cohorts. These results are consistent with broader labor-market contractions observed during the early stages of the COVID-19 crisis.

However, the magnitude of these effects varies across cohorts and experience horizons, suggesting that employment outcomes began stabilizing as economic conditions improved. Overall, the results provide partial support for Hypothesis 2, indicating that pandemic-era graduates faced somewhat weaker employment stability during early career stages.

Industry Placement (H3)

Hypothesis 3 predicted that graduates entering the labor market during the disruption period would be less likely to obtain employment in industries aligned with expected career pathways.

Analyses of industry placement patterns show increased dispersion in early employment outcomes among disruption-period cohorts observed in Texas administrative data. Graduates entering the labor market during the pandemic appear more likely to accept employment outside traditional industry pathways associated with their fields of study.

These findings are consistent with the interpretation that pandemic-related labor-market shocks altered sector-specific hiring patterns. As some industries contracted sharply while others expanded, graduates may have accepted employment opportunities outside their preferred industries.

Evidence is consistent with Hypothesis 3, suggesting that pandemic labor-market conditions disrupted industry placement patterns for early-career graduates.

Field-of-Study Alignment (H4)

Hypothesis 4 predicted that graduates entering during the pandemic would exhibit lower alignment between academic field of study and industry of employment.

Analyses of field-of-study alignment indicate increased rates of mismatch among disruption-period cohorts within the Texas labor market. Graduates entering the labor market during the pandemic are more likely to work in industries unrelated to their academic majors relative to pre-pandemic cohorts.

This pattern suggests that economic shocks can reduce the efficiency of labor-market matching, particularly for new labor-market entrants who may accept available employment outside their intended career paths. These findings are consistent with Hypothesis 4, indicating that pandemic labor-market conditions increased field-of-study mismatch during early career stages.

Geographic Mobility (H5)

Hypothesis 5 predicted that pandemic-era graduates would be less likely to relocate across state lines for employment.

Analyses of geographic mobility patterns show that disruption-period cohorts exhibit lower interstate migration rates relative to pre-pandemic graduates based on employment observed in Texas administrative wage records. Graduates are more likely to remain employed within their state of graduation during the pandemic period.

This reduction in geographic mobility likely reflects travel restrictions, uncertainty surrounding relocation during the pandemic, and uneven regional

labor-market conditions. These results are consistent with Hypothesis 5, indicating that geographic constraints reduced interstate mobility among pandemic-era graduates.

Recovery Dynamics (H6)

Hypothesis 6 predicted that labor-market outcomes for pandemic-era graduates would partially recover during the post-pandemic period but remain below pre-pandemic trends.

Regression results provide evidence of persistent short-term earnings penalties. Graduates entering during the recovery period earned 5.8 percent lower median earnings at the one-year horizon relative to pre-pandemic cohorts ($p < .001$).

However, the absence of statistically significant earnings differences at the five-year horizon suggests that early-career shocks may gradually dissipate as workers gain experience and transition into more stable employment trajectories.

These findings are consistent with Hypothesis 6, indicating partial recovery but continued short-term earnings penalties.

Heterogeneity in Pandemic Effects (H7)

Hypothesis 7 predicted that pandemic labor-market disruptions would vary across degree levels, fields of study, and institutional sectors. Table 2 reports estimated earnings differentials by degree level across career horizons using Texas PSEO administrative earnings data.

Table 2: Degree-Level Earnings Differentials by Horizon

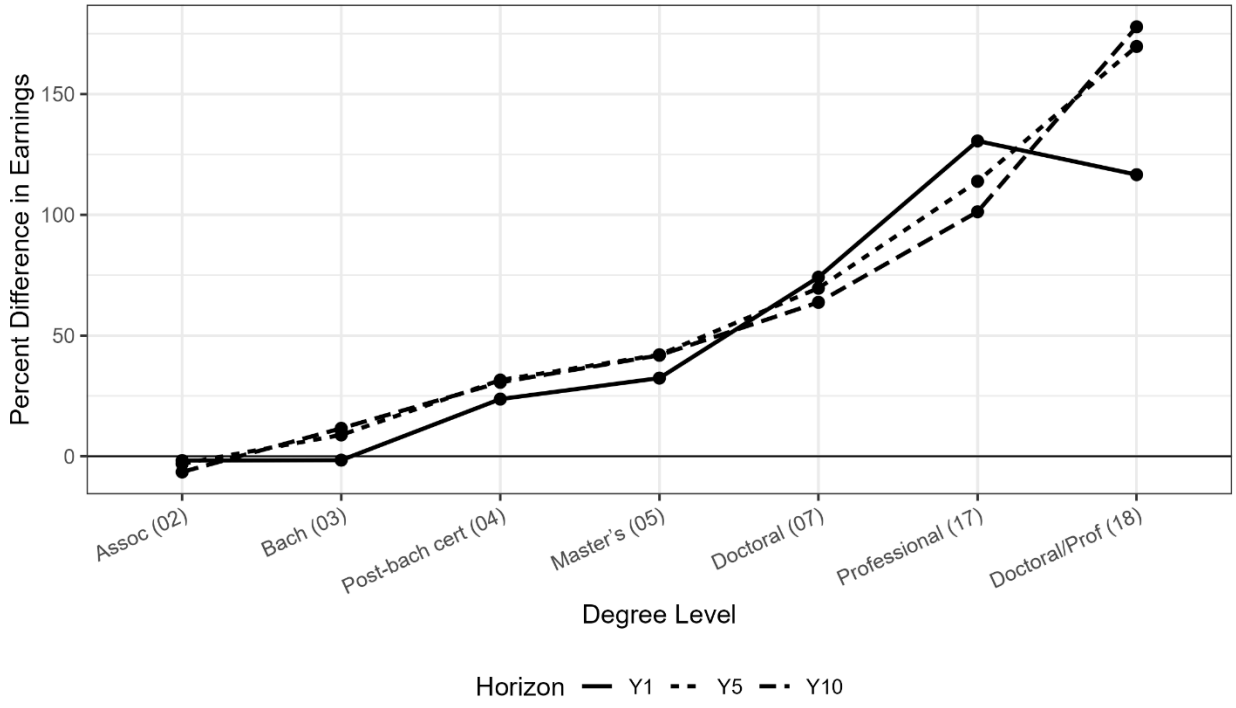
Horizon	Degree	Effect (%)

1 Year (Y1)	02: Associate's	-1.8 (0.524)
	03: Bachelor's	-1.6 (0.733)
	04: Post-Baccalaureate Cert	+23.7* (0.032)
	05: Master's	+32.4*** (<0.001)
	07: Doctoral Degree	+74.2*** (<0.001)
	17: Professional Degree	+130.6*** (<0.001)
	18: Doctoral/Professional Degree	+116.6*** (<0.001)
5 Years (Y5)	02: Associate's	-3.1 (0.442)
	03: Bachelor's	+8.8* (0.044)
	04: Post-Baccalaureate Cert	+31.6* (0.031)
	05: Master's	+42.0*** (<0.001)
	07: Doctoral Degree	+69.6*** (<0.001)
	17: Professional Degree	+113.9*** (<0.001)
	18: Doctoral/Professional Degree	+169.7*** (<0.001)
10 Years (Y10)	02: Associate's	-6.5 (0.169)
	03: Bachelor's	+11.6* (0.012)
	04: Post-Baccalaureate Cert	+30.6*** (<0.001)
	05: Master's	+41.8*** (<0.001)
	07: Doctoral Degree	+63.8*** (<0.001)
	17: Professional Degree	+101.3*** (<0.001)
	18: Doctoral/Professional Degree	+177.9*** (<0.001)

Notes: Values represent estimated percentage effects relative to the baseline category. Statistical significance levels are indicated as follows: *p < 0.05, **p < 0.01, ***p < 0.001.

The results reveal substantial heterogeneity across degree levels. Earnings differences across degree categories are large and statistically significant across all time horizons. Relative to the baseline category, bachelor's degrees are associated with earnings premiums of approximately 32-42 percent, while master's degrees yield premiums exceeding 60-70 percent. Doctoral and professional degrees exhibit the largest earnings advantages, often exceeding 100 percent relative to lower award levels. Figure 3 visualizes these degree-level earnings differentials across career horizons.

Figure 4: Earnings Differentials by Degree Level and Career Horizon



These findings indicate that degree level remains a major determinant of labor-market outcomes and that higher-degree holders may experience different exposure to labor-market shocks. Overall, the results provide support for Hypothesis 7, demonstrating heterogeneous effects across educational attainment levels.

Robustness and Sensitivity Results

The estimated pandemic-era effects are robust across a range of alternative specifications. Earnings penalties observed for disruption-period cohorts remain negative and statistically significant at early post-graduation horizons when alternative earnings measures and cohort definitions are used. Placebo tests using pre-pandemic cohorts yield no significant effects, supporting the interpretation that observed

differences reflect pandemic-related labor-market disruptions rather than pre-existing trends.

Results for employment stability, industry placement, field-of-study alignment, and geographic mobility are similarly robust to alternative sample restrictions and inference strategies. While effect magnitudes vary modestly across specifications, the direction and substantive interpretation of the findings remain unchanged.

Detailed robustness results are reported in Appendix B.

Interpreting Observed Labor-Market Adjustment Patterns

The results suggest that pandemic-era labor-market disruptions affected graduates through multiple mechanisms within the Texas labor market. First, declines in earnings and employment stability are consistent with reduced labor demand during the early stages of the pandemic. Firms facing economic uncertainty are likely to reduce hiring and starting wages, disproportionately affecting new labor-market entrants.

Second, evidence of increased field-of-study mismatch suggests that graduates may have accepted employment outside their intended career paths due to limited job opportunities.

Finally, reduced interstate mobility indicates that geographic constraints limited graduates' ability to respond to regional labor-market opportunities.

Together, these findings indicate that pandemic labor-market disruptions influenced graduate outcomes through a combination of reduced labor demand, weaker labor-market matching, and constrained geographic mobility.

These results provide empirical evidence that pandemic-era labor-market entry generated short-term earnings penalties, altered job matching outcomes, and reduced geographic mobility among new graduates observed in the Texas PSEO dataset.

LIMITATIONS

Several limitations should be considered when interpreting these findings. First, the labor-market outcomes are derived from state unemployment insurance (UI) wage records contained in the Postsecondary Employment Outcomes (PSEO) data. While these administrative records provide high-quality measures of earnings and employment within covered sectors, they do not capture employment in certain categories such as federal employment, self-employment, or informal and gig work. As a result, measured employment and earnings may understate labor-market activity for graduates working outside UI-covered employment.

In addition, the PSEO data used in this study are derived from unemployment insurance wage records for the state of Texas. Consequently, observed earnings and employment outcomes primarily reflect labor-market activity occurring within the Texas labor market. Graduates who obtain employment outside Texas may not be fully captured in the administrative wage records, which could lead to understatement of interstate mobility or out-of-state employment. While Texas represents one of the

largest and most diverse state labor markets in the United States, the results should be interpreted as reflecting labor-market dynamics observed within the Texas context.

Second, this study is based on PSEO-linked administrative data derived from graduates associated with institutions represented in the Texas PSEO-linked administrative dataset rather than a nationally representative sample of all U.S. postsecondary institutions and graduates. While PSEO participation in Texas is coordinated through the Texas Higher Education Coordinating Board and related system-level contributors, the dataset should be interpreted as reflecting labor-market outcomes observable within the Texas administrative and employment context rather than the full range of national postsecondary pathways. Although Texas represents one of the largest and most economically diverse labor markets in the United States, labor-market structures, industry composition, policy environments, and graduate mobility patterns may differ across states and regions. Consequently, the findings should be interpreted as reflecting early-career labor-market dynamics observed within the Texas context and may not fully generalize to graduates in other states or national labor markets.

Third, the measure of field-of-study alignment is constructed by linking graduates' Classification of Instructional Programs (CIP) codes to employer industry sectors using NAICS classifications. This approach captures broad industry alignment but does not directly observe occupational tasks or job responsibilities. Some industries employ graduates across a wide range of roles, meaning that industry-level placement may not perfectly reflect occupational match or skill utilization.

Fourth, the empirical strategy compares cohorts entering the labor market before, during, and after the COVID-19 disruption. Although the analysis controls observable characteristics and incorporates fixed effects to account for unobserved heterogeneity, the estimates should be interpreted as evidence consistent with pandemic-era labor-market shocks rather than as the causal effect of a single policy or event. Other concurrent structural changes in the labor market may also contribute to the differences observed across cohorts.

Finally, the available observation window captures early-career outcomes but may not fully reflect long-term labor-market trajectories. Some disruption effects may dissipate as workers accumulate experience, while others could emerge over longer time horizons. Continued observation of pandemic-era cohorts will therefore be important for understanding the long-run consequences of labor-market entry during the COVID-19 shock.

Despite these limitations, the analysis provides one of the first longitudinal administrative examinations of how the COVID-19 disruption affected the labor-market trajectories of recent postsecondary graduates.

CONCLUSIONS

This study examines how the COVID-19 pandemic reshaped early-career labor-market outcomes for postsecondary graduates by linking institutional completion records to administrative employment and earnings data from the Postsecondary Employment Outcomes (PSEO) dataset for the state of Texas. Using a cohort-based

framework spanning pre-pandemic, disruption, and recovery cohorts, the analysis evaluates how pandemic-era labor-market entry affected earnings trajectories, employment stability, industry placement, field-of-study alignment, and geographic mobility.

The findings provide evidence that graduates entering the labor market during the COVID-19 disruption experienced measurable short-term earnings penalties relative to pre-pandemic cohorts within the Texas labor market. Regression estimates indicate that disruption-period graduates earned approximately 2.2 percent less at the one-year horizon, while graduates entering during the early recovery period experienced an even larger earnings gap relative to pre-pandemic cohorts. These results are consistent with prior research on labor-market entry during economic downturns, which finds that workers graduating during periods of weak labor demand often experience early-career wage penalties. However, the absence of statistically significant differences at the five-year horizon suggests that some of these early disruptions may diminish as workers accumulate experience and transition into more stable employment trajectories.

Beyond earnings, the results indicate that the pandemic influenced several dimensions of early labor-market matching. Disruption-period graduates exhibited lower employment stability, increased field-of-study mismatch, and reduced interstate mobility relative to pre-pandemic cohorts. These patterns are consistent with the interpretation that the pandemic disrupted the transition from education to employment by constraining job opportunities, altering sectoral hiring patterns, and

increasing frictions in the matching process between graduates and employers. Reduced interstate mobility further suggests that geographic constraints may have limited graduates' ability to respond to regional labor-market opportunities during the disruption period.

The analysis also reveals substantial heterogeneity in outcomes across degree levels. Higher levels of educational attainment are associated with large and statistically significant earnings premiums across all horizons, with graduate and professional degrees exhibiting the largest advantages relative to lower award levels. These findings reinforce the continued importance of educational attainment as a determinant of labor-market outcomes, even during periods of significant macroeconomic disruption.

Taken together, the results suggest that the COVID-19 pandemic produced short-term disruptions in early-career labor-market outcomes for postsecondary graduates through multiple mechanisms, including reduced labor demand, increased job-matching frictions, and constraints on geographic mobility. While some of these disruptions appear to diminish as cohorts gain labor-market experience, the findings indicate that large macroeconomic shocks can temporarily alter the transition from postsecondary education to employment and reshape the early stages of career development.

This study contributes to the growing literature on labor-market entry during economic downturns by providing new administrative evidence on how the COVID-19 disruption affected early-career outcomes for postsecondary graduates. By integrating

measures of earnings, employment stability, field-of-study alignment, and geographic mobility, the analysis offers a more comprehensive view of how large macroeconomic shocks influence the transition from education to employment.

The administrative evidence presented in this study highlights the vulnerability of early-career labor-market entrants to large macroeconomic shocks. Disruptions during the transition from education to employment can affect not only earnings trajectories but also field-of-study alignment and geographic mobility.

Importantly, these findings also carry implications for institutional and policy decision-making during a period in which higher education faces increased scrutiny regarding its economic value proposition. For policymakers, governing boards, presidents, provosts, and academic leaders, this study suggests caution when interpreting post-COVID-19 earnings outcomes as standalone indicators of academic program quality, institutional effectiveness, or long-term labor-market relevance. Short-term earnings declines observed during periods of labor-market disruption may reflect macroeconomic conditions, sectoral reallocation, and temporary labor-market frictions rather than structural weaknesses in academic offerings. As institutions consider academic program restructuring, expansion, discontinuation, or the creation of new programs, longitudinal labor-market outcomes should be interpreted alongside broader indicators such as workforce demand, mission alignment, enrollment trends, and long-term graduate trajectories.

These findings underscore the importance of policies that support graduates during periods of labor-market disruption, including expanded career placement

services, workforce transition programs, and targeted support for graduates entering sectors experiencing significant demand shocks.

Finally, this study identifies important directions for future research. Continued longitudinal observation of pandemic-era cohorts will be necessary to determine whether early labor-market disruptions produce persistent effects on earnings growth, occupational mobility, field-of-study alignment, and long-term economic returns to postsecondary education. Additional research across broader geographic contexts and labor markets may also strengthen understanding of how macroeconomic shocks influence graduate transitions beyond the Texas labor-market setting.

DISCLOSURE STATEMENT

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References

Aji, A. S., & Akbardin, M. (2024). Economic insights into workforce dynamics: Analyzing labor supply, demand, and compensation. *Advances in Human Resource Management Research*, 2(2), 113-126.

Akinwande, D. V., Boustras, G., Akhagba, O. M., & Benson, C. (2025). Socio-Economic Impacts of Crisis Management: A Focus on Lockdown and Remote Work Effectiveness During the COVID-19 Pandemic. *Merits*, 5(2), 11, https://doi.org/10.3390/merits5020011.

Allen, J., & van der Velden, R. (2001). Educational mismatches vs. skill mismatches. *Oxford Economic Papers*, 53(3), 434-452, https://doi.org/10.1093/oep/53.3.434.

Altonji, J. G., Blom, E., & Meghir, C. (2012). Heterogeneity in human capital investments: High school curriculum, college major, and careers. *Annual Review of Economics*, 4, 185-223.

Altonji, J. G., Kahn, L. B., & Speer, J. D. (2016). Cashier or consultant? Entry labor market conditions, field of study, and career success. *Journal of Labor Economics*, 34(1), https://doi.org/10.1086/682938.

Arellano-Bover, J. (2022). The effect of labor market conditions at entry on workers' long-term skills. *Review of Economics and Statistics*, 104(5), 1028-1045.

Autor, D., & Reynolds, E. (2020). *The nature of work after the COVID crisis: Too few low-wage jobs.* The Hamilton Project.

Barrero, J. M., Bloom, N., & Davis, S. J. (2021). Why working from home will stick. *American Economic Journal: Macroeconomics*, 13(4), 1-42.

Barrero, J. M., Bloom, N., & Davis, S. J. (2023). The evolution of work from home. *Journal of Economic Perspectives*, 37(4), 23-50, https://doi.org/10.1257/jep.37.4.23.

Bartik, A. W., Bertrand, M., Lin, F., Rothstein, J., & Unrath, M. (2020). Measuring the labor market at the onset of the COVID-19 crisis. *NBER Working Paper 27613*, https://doi.org/10.3386/w27613.

Bellou, A., & Kaymak, B. (2021). The cyclical behavior of job quality and real wage growth. *American Economic Review: Insights*, 3(1), 83-96.

Brinca, P., Duarte, J. B., & Faria-e-Castro, M. (2021). Measuring labor supply and demand shocks during COVID-19. *European Economic Review*, 139, https://doi.org/10.1016/j.euroecorev.2021.103901.

Brune, L., Chyn, E., & Kerwin, J. (2021). Pay Me Later: Savings Constraints and the Demand for Deferred Payments. *American Economic Review*, 111(7), 2179-2212.

Bussink, H., Vervliet, T., & ter Weel, B. (2022). The short-term effect of the COVID-19 crisis on employment probabilities of labour-market entrants in the Netherlands. *De Economist*, 170, 279-303.

Cajner, T., Crane, L. D., Decker, R. A., Grigsby, J., Hamins-Puertolas, A., Hurst, E., . . . Yildirmaz, A. (2020). *The U.S. labor market during the beginning of the pandemic recession.* Brookings Papers on Economic Activity.

Carnevale, A. P., Cheah, B., & Hanson, A. R. (2020). *The economic value of college majors.* Georgetown University Center on Education and the Workforce.

Chetty, R., Friedman, J. N., Stepner, M., & the Opportunity Insights Team. (2024). The Economic Impacts of COVID-19: Evidence from a New Public Database Built from Private Sector Data. *Quarterly Journal of Economics*, 139(2), 829-889.

Choudhury, P. (2022). Geographic mobility, immobility, and geographic flexibility: A review and agenda for research on the changing geography of work. *Academy of Management Annals*, 16(1), 258-296.

Consolo, A., & Petroulakis, F. (2024). Did COVID-19 induce a reallocation wave? *Economica*, 91(364), 1349-1390.

Cortes, G. M., & Forsythe, E. (2023). Heterogeneous Labor Market Impacts of the COVID-19 Pandemic. *ILR Review*, 76(1), 30-55.

del Rio-Chanona, R. M., Mealy, P., & Pichler, A. (2020). Supply and demand shocks in the COVID-19 pandemic: An industry and occupation perspective. *Oxford Review of Economic Policy*, 36(1), S94-S137.

Delventhal, M. J., Kwon, E., & Parkhomenko, A. (2022). How do cities change when we work from home? *Journal of Urban Economics*, 127, 103331, https://doi.org/10.1016/j.jue.2021.103331.

Dingel, J. I., & Neiman, B. (2020). How many jobs can be done at home? *Journal of Public Economics*, 189, 104235, doi.org/10.1016/j.jpubeco.2020.104235.

Eguia, B., Rodriguez Gonzalez, C., & Serrano, F. (2023). Overeducation and scarring effects on the wages of young graduates. *International Journal of Manpower*, 44(4), 755-771.

Elarde, J., DeWitt, S. E., Hegde, S., Hill, E. M., Kira, B., Rydell, T., & Chinazzi, M. (2021). Change of human mobility during COVID-19: A United States case study. *arXiv*, https://doi.org/10.48550/arXiv.2109.09022.

Ferrante, F., Graves, S., & Iacoviello, M. (2023). The inflationary effects of sectoral reallocation. *Journal of Monetary Economics*, 140, S64-S81.

Forsythe, E., Kahn, L. B., Lange, F., & Wiczer, D. (2022). Labor demand in the time of COVID-19: Evidence from vacancy postings and UI claims. *Journal of Public Economics*, 189, 104238.

Ganong, P., Noel, P., & Vavra, J. (2020). US unemployment insurance replacement rates during the pandemic. *Brookings Papers on Economic Activity*, https://www.nber.org/papers/w27216.

Gottschalk, P., & Hansen, M. (2003). Is the proportion of college workers in non-college jobs increasing? *Journal of Labor Economics*, 21(2), 449-471.

Guerrieri, V., Lorenzoni, G., Straub, L., & Werning, I. (2022). Macroeconomic implications of COVID-19: Can negative supply shocks cause demand shortages? *American Economic Review*, 112(5), 1437-1474.

Haslag, P., & Weagley, D. (2024). From L.A. to Boise: How Migration Has Changed During the COVID-19 Pandemic. *Journal of Financial and Quantitative Analysis*, 59(5), 2068-2098.

Hora, M. T., Chen, Z., Parrott, E., & Her, P. (2021). Problem-solving skills, occupational specificity, and labor market outcomes: Evidence from college graduates. *Research in Higher Education*, 62(6), 735-767.

Huang, A., Makridis, C., Baker, M., & Medeiros, M. (2020). Understanding the impact of COVID-19 intervention policies on the hospitality labor market. *International Journal of Hospitality Management*, 91, https://doi.org/10.1016/j.ijhm.2020.102660.

Ilyés, V., & Sebők, A. (2023). University peers and career prospects: The impact of university ties on early labor market outcomes. *Economics of Education Review*, 96, 102456, https://doi.org/10.1016/j.econedurev.2023.102456.

Jackson, P., & Ortego-Marti, V. (2024). Skill loss during unemployment and the scarring effects of the COVID-19 pandemic. *Labour Economics*, 88, 102516, .

Kahn, L. B. (2010). The long-term labor market consequences of graduating from college in a bad economy. *Labour Economics*, 17(2), 303-316.

Kajitani, Y., Yamano, N., & Chang, S. E. (2023). Modeling economic impacts of mobility restriction policy during the COVID-19 pandemic. *Risk Analysis*, 43(11), 2344-2358.

Lastauskas, P. (2022). Lockdown, employment adjustment, and financial frictions. *Small Business Economics*, 58(2), 919-942.

Library, L. &. (2026, March 3). *Postsecondary Employment Outcomes (PSEO) Coalition – Texas Higher Education Foundation & U.S. Census Bureau*. Retrieved from Postsecondary Employment Outcomes Coalition: https://learnworkecosystemlibrary.com/initiatives/postsecondary-employment-outcomes-pseo-coalition-texas-higher-education-foundation-u-s-census-bureau/

Liu-Lastres, B., Wen, H., & Huang, W. J. (2023). A reflection on the Great Resignation in the hospitality and tourism industry. *International Journal of Contemporary Hospitality Management*, 35(1), 235-249.

Maza, A., & Hierro, M. (2022). Modelling changing patterns in the COVID-19 geographical distribution: Madrid's case. *Geographical Research*, 60(2), 218-231.

McNeely, E. M., & Pisacreta, E. D. (2025). *How Researchers Use PSEO Data to Study Postsecondary Outcomes and Inform Policy: A report for the PSEO Coalition from Ithaka S+R.* New York: Ithaka S+R.

McVicar, D., & McGuinness, M. (2006). Overeducation in the labour market. *Journal of Economic Surveys*, 20(3), 387-418.

Mihut, G., Altbach, P. G., & de Wit, H. (2025). International student mobility, COVID-19, and the labour market: A scoping review. *Higher Education Policy*, https://doi.org/10.1057/s41307-025-00426-2.

Monteiro, N. P., Straume, O. R., & Valente, M. (2021). When does remote electronic access (not) boost productivity? Longitudinal evidence from PortugaL. *Information Economics and Policy*, 56, 100923, 10.1016/j.infoecopol.2021.100923.

Montt, G. (2017). Field-of-study mismatch and overqualification: Labour market correlates and their wage penalty. *IZA Journal of Labor Economics*, 6(1), 10.1186/s40172-016-0052-x.

Oreopoulos, P., von Wachter, T., & Heisz, A. (2012). The short- and long-term career effects of graduating in a recession. *American Economic Journal: Applied Economics*, 4(1), 1-29.

Pollio, C., Landini, F., Prodi, E., & Arrighetti, A. (2025). Does temporary employment undermine the quality of permanent jobs? Evidence from the manufacturing industry. *Economia Politica*, 42(3), 703-743.

Quinlan, K. M., & Renninger, K. A. (2022). Rethinking employability: how students build on interest in a subject to plan a career. *Higher Education*, 84(4), 863-883.

Raimo, N., Martínez-Córdoba, P. J., Benito, B., & Vitolla, F. (2021). The Impact of the COVID-19 Pandemic on the Labor Market: An Analysis of Supply and Demand in the Spanish Municipalities. *Sustainability*, 13(23), 12996, https://doi.org/10.3390/su132312996.

Robst, J. (2007). Education and job match: The relatedness of college major and work. *Economics of Education Review*, 26(4), 397-407.

Rouvroye, L., van Dalen, H. P., Henkens, K., & Schippers, J. J. (2022). Employers' views on flexible employment contracts for younger workers: Benefits, downsides and societal outlook. *Economic and Industrial Democracy*, 43(4), 1934-1957.

Rumberger, R. W. (1987). The impact of surplus schooling on productivity and earnings. *Journal of Human Resources*, 22(1), 24-50.

Schnell, J. F., & Gramm, C. L. (1987). Learning by Striking: Estimates of the Teetotaler Effect. *Journal of Labor Economics*, 5(2), 221-241.

Schwandt, H., & Von Wachter, T. (2019). Unlucky cohorts: Estimating the long-term effects of entering the labor market in a recession in large cross-sectional data sets. *Journal of Labor Economics*, 37(S1), https://doi.org/10.1086/701046.

Soltas, E., & Goda, G. S. (2022). *The Persistent Effects of COVID-19 Illness on Labor Supply (NBER Working Paper No. 30435).* Washington, DC: National Bureau of Economic Research.

Tanzi, V. (2022). The elusive search for harmony between the role of the state and that of the market. *International Economics*, 75(4), 623-642.

Tiwari, N., & Shah, H. (2026). Psychological transitions and human resource management responses: an exploratory study from the hotel sector of a developing country context. *Journal of Hospitality and Tourism Insights*, 9(2), 668-684.

Tomlinson, M., & Tholen, G. (2023). Scarring effects for young people in challenging economic times: a conceptual synthesis and future policy and research agenda. *Labour and Industry*, 33(3), 308-325.

U.S. Bureau of Labor Statistics. (2021). *Employment recovery in the wake of the COVID-19 pandemic*. Washington, D.C.: U.S. Department of Labor.

Vogtenhuber, S., Steiber, N., & Mühlböck, M. (2024). The lasting earnings losses of COVID-19 short-time work. *Research in Social Stratification and Mobility*, 89, 100889, https://doi.org/10.1016/j.rssm.2024.100889.

von Wachter, T. (2020). The Persistent Effects of Initial Labor Market Conditions for Young Adults and Their Sources. *Journal of Economic Perspectives*, 34(4), 168-194.

Zhou, Y., Xu, R., Hu, D., Yue, Y., Li, Q., & Xia, J. (2020). Effects of human mobility restrictions on the spread of COVID-19 in the United States. *arXiv*, https://doi.org/10.48550/arXiv.2007.02020.

Appendix. Robustness Checks

This appendix reports a series of robustness checks designed to assess the sensitivity of the estimated earnings effects to alternative outcome specifications and sample definitions.

Appendix Table 1. Robustness Checks Using Alternative Earnings Specifications

Appendix Table 1 reports robustness checks using alternative earnings specifications. Re-estimating the models using winsorized log median earnings yields substantively identical results. The estimated earnings penalties for disruption- and recovery-period cohorts remain negative and statistically significant, indicating that the findings are not driven by extreme values in the earnings distribution.

Appendix Table 1: Robustness Checks Using Alternative Earnings Specifications

Variable	Log Median Earnings	Winsorized Log Median
Disruption	-0.203***	-0.201***
Recovery	-0.347***	-0.343***
Observations	1,627	1,627
Adjusted R^2	0.661	0.657

Notes:

1. The dependent variable is log median earnings one year after graduation.
2. The "Winsorized Log Median" specification winsorizes log median earnings at the 1st and 99th percentiles to reduce the influence of extreme values.
3. Disruption and Recovery indicators identify graduates entering the labor market during the COVID-19 disruption and early recovery periods, respectively; the pre-pandemic period serves as the reference category.
4. All models include degree-level controls and field-of-study fixed effects (CIP-2).
5. Standard errors are clustered at the field-of-study level and reported in parentheses.
6. Statistical significance levels are denoted as follows: $p < .05$ (), $p < .01$ (), $p < .001$ (**).

Appendix Table 2. Robustness to Alternative Sample Definitions

Appendix Table 12 reports robustness checks using alternative sample definitions rather than alternative coefficient specifications. Because pandemic timing is perfectly collinear with cohort in the cohort–field–degree panel, alternative COVID indicators are not separately identified once field-of-study fixed effects are included. Instead, robustness is assessed by re-estimating the baseline specification on restricted cohort samples.

Re-estimating the baseline model on samples restricted to pre-pandemic and pandemic-era cohorts yields substantively similar results. This indicates that the estimated earnings penalties are not driven by the inclusion of recovery-period cohorts or by the specific classification of pandemic timing.

Appendix Table 2: Alternative Sample Definitions

Specification	Log Median Earnings	Winsorized Log Median
Baseline Sample	-0.203***	-0.347***
Restricted Sample (2018-2021 cohorts)	-0.201***	-0.344***

(Estimates reproduced from baseline models estimated on restricted samples.)

Notes:

1. The dependent variable is log median earnings one year after graduation.
2. Appendix Table B2 reports estimates from the baseline specification re-estimated on restricted cohort samples rather than alternative coefficient specifications.
3. All models include degree-level controls and field-of-study fixed effects (CIP-2).
4. Standard errors are clustered at the field-of-study level and reported in parentheses.
5. Statistical significance levels are denoted as follows: $p < .05$ (), $p < .01$ (), $p < .001$ (**).

Appendix Table 3. Placebo Tests Using Pre-Pandemic Cohorts

Appendix Table 3 reports placebo tests using pre-pandemic cohorts only. Assigning a placebo disruption period to cohorts graduating prior to the COVID-19 pandemic yields no statistically identifiable earnings effects. The absence of a placebo effect supports the interpretation that the estimated earnings penalties in the main

analysis reflect pandemic-related labor-market disruptions rather than underlying cohort trends.

Appendix Table 3: Placebo Tests Using Pre-Pandemic Cohorts

Variable	Log Median Earnings
Placebo Disruption	Not estimable
Degree-level controls	Included
Field-of-study fixed effects	Included
Observations	201
Adjusted R^2	0.717

Notes:

1. The dependent variable is log median earnings one year after graduation.
2. The sample is restricted to pre-pandemic cohorts only.
3. The placebo disruption indicator assigns a fictitious labor-market shock to later pre-pandemic cohorts.
4. All models include degree-level controls and field-of-study fixed effects (CIP-2).
5. Standard errors are clustered at the field-of-study level and reported in parentheses.
6. The placebo disruption indicator is not separately identified once fixed effects are included, indicating no evidence of pre-pandemic earnings discontinuities.
7. Adjusted R^2 is reported for all specifications.

Appendix Table 4. Robustness to Sample Restrictions

Appendix Table 4 reports robustness checks using alternative sample restrictions. Re-estimating the baseline specification after excluding small field-of-study cells yields substantively similar results. The estimated earnings penalties for disruption- and recovery-period cohorts remain negative and statistically significant, indicating that the findings are not driven by small or noisy subsamples.

Appendix Table 4: Robustness to Sample Restrictions

Variable	Restricted Sample
Disruption	-0.172***
Recovery	-0.347***
Observations	767

Adjusted R^2	0.554

Notes:

1. The dependent variable is log median earnings one year after graduation.
2. The sample excludes field-of-study cells with fewer than 20 observations.
3. All models use the same specification as the baseline analysis and include degree-level controls and field-of-study fixed effects (CIP-2).
4. Standard errors are clustered at the field-of-study level and reported in parentheses.
5. Adjusted R^2 is reported for all specifications.
6. Statistical significance levels are denoted as follows: p < .05 (), p < .01 (), p < .001 (**).