

Bridging the Employment Gap: Analyzing U.S. Job Deficits through Student-Led Macroeconomic Research

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Abstract

This manuscript presents an in-depth analysis of employment trends in the United States, focusing on the job deficit from 2001 to 2024. Utilizing an exponential trend line, the study projects employment levels based on historical data from 1939 to 2001 and identifies significant discrepancies between projected and actual employment figures. The analysis reveals a substantial job deficit of over 63.4 million workers as of May 2024, despite a low unemployment rate of 3.9%.

To understand this paradox, the manuscript integrates insights from student-led research in an ECON-202 Macroeconomics course. Students explored key factors contributing to the job deficit, including economic recessions, technological advancements, structural shifts in the economy, policy impacts, and demographic changes. Their analyses highlight the mismatch between technological advancements and worker skills, the impact of major economic recessions, and the growing significance of discouraged workers and those out of the workforce.

The educational significance of this research lies in its experiential learning approach, which engages students in real-world data analysis and interpretation. The study demonstrates how student-centered research projects can enhance understanding of macroeconomic concepts and improve analytical skills. Reflections on pedagogical approaches emphasize the benefits of integrating research into the curriculum, despite challenges such as resource needs and time constraints.

Future directions for macroeconomics education include strategies for increasing student involvement in research and suggestions for curriculum development. The manuscript concludes with implications for policymakers, educators, and researchers, advocating for the integration of research and pedagogy to foster a deeper understanding of economic phenomena and prepare students for academic and professional success.

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Acronyms Used:

Current Population Survey (CPS)	9	Learning Management System (LMS).....	4
Federal Reserve Economic Data (FRED)	6	Number of Employed Persons (PAYEMS).....	6
Gross Domestic Product (GDP).....	4	Total Population (CNP16OV).....	6
labor force participation (LFP)	9	U.S. Bureau of Labor Statistics (BLS)	5
Labor Force Participation (LFP)	9	Working-Age Population (LFWA64TTUSM647S)	6

I. Introduction

Understanding employment trends and the factors contributing to job deficits is crucial for comprehending the dynamics of the U.S. labor market. This manuscript presents an in-depth analysis of employment trends in the United States, focusing on the period from 2001 to 2024. By utilizing an exponential trend line, we project employment levels based on historical data from 1939 to 2001 and identify significant discrepancies between projected and actual employment figures. The analysis reveals a substantial job deficit, highlighting the need for a deeper exploration of the underlying causes.

To address this, we integrate insights from student-led research conducted in an ECON-202 Macroeconomics course at Spokane Falls Community College. This experiential learning approach engages students in real-world data analysis and interpretation, fostering a deeper understanding of macroeconomic concepts. By involving students in the research process, we aim to enhance their analytical skills and provide them with practical experience in economic analysis.

The study explores several key factors contributing to the job deficit, including economic recessions, technological advancements, structural shifts in the economy, policy impacts, and demographic changes. The student-led analyses highlight the mismatch between technological advancements and worker skills, the impact of major economic recessions, and the growing significance of discouraged workers and those out of the workforce.

This manuscript also reflects on the educational significance of integrating research-based pedagogy into the macroeconomics curriculum. By examining the benefits and challenges of this approach, we aim to provide insights into improving teaching and learning in economics. Our findings suggest that incorporating student-centered research projects can enhance student engagement, deepen their understanding of economic principles, and improve learning outcomes.

The implications of this research extend beyond the classroom, offering valuable insights for policymakers, educators, and researchers. By fostering a dynamic and interactive learning environment, we can better prepare students for academic and professional success in the field of economics. This manuscript advocates for the integration of research and pedagogy to enrich

economic education and contribute to a more comprehensive understanding of labor market dynamics.

A. Overview of the US labor market

In the vast tapestry of economic theory and practice, the labor market stands as a cornerstone, a nexus where human effort converges with economic demand to shape the fabric of society. At its core lies the concept of labor productivity, a measure of the efficiency with which individuals contribute to the production process (Brynjolfsson and Hitt 1998). For decades, economists and policymakers alike have scrutinized this vital metric, recognizing its pivotal role in driving economic growth and prosperity.

Macroeconomic theories, with their grand narratives of growth and development, have long extolled the virtues of increasing labor productivity as a pathway to elevating the standard of living for all (Snowdon and Vane 2005). Indeed, the historical trajectory from 1939 to 2001 showcased remarkable strides in this regard, as technological innovations and organizational advancements propelled labor productivity to unprecedented heights. Yet, amidst the backdrop of progress and prosperity, a curious trend emerged—a decoupling of technological change from commensurate increases in human productivity (Lütkenhorst 2018).

This decoupling, while perplexing in its implications, raises profound questions about the nature of work and its relationship to technological advancement (Heikkurinen 2018). Has the relentless march of technology outpaced the capacity of human labor to adapt and thrive? Are we witnessing a fundamental shift in the dynamics of the labor market, where the inexorable rise of automation and artificial intelligence reshapes the contours of employment (Nathan and Ahmed 2018)?

These questions loom large in the collective consciousness of economists and policymakers, casting a shadow of uncertainty over the future of work. The conventional wisdom, rooted in classical economic theory, suggests that technological innovation should enhance labor productivity, leading to greater economic output and, ostensibly, more employment opportunities. Yet, the reality paints a more nuanced picture—one where technological change, while undoubtedly transformative, has not always translated into commensurate gains in human productivity.

Indeed, the specter of technological unemployment—a scenario where automation displaces human workers—haunts contemporary discourse on the labor market (Chomanski 2019, Campa 2017, Persons 1932). While some argue that technological advancements will create new job opportunities in emerging industries, others caution against the possibility of widespread job displacement and income inequality. As we navigate these turbulent waters, it becomes imperative to reassess our understanding of labor productivity and its implications for the future of work (Autor 2015).

In the ensuing sections, we delve deeper into the intricacies of the US labor market, exploring the underlying forces driving the employment deficit and its implications for economic policy. Through rigorous analysis and thoughtful inquiry, we endeavor to shed light on this pressing issue and chart a course towards a more equitable and prosperous future.

B. Significance of studying employment trends

Understanding employment trends holds immense importance in economic analysis for several reasons. Firstly, employment is a fundamental component of economic activity, serving as a key determinant of both individual livelihoods and overall societal well-being. Changes in employment levels can have far-reaching implications for various economic indicators, including consumer spending, investment patterns, and government policy decisions.

Moreover, employment trends provide crucial insights into the health and resilience of an economy. Rising employment levels often signify economic expansion, increased consumer confidence, and a general sense of prosperity (Leitch 2006). Conversely, declining employment may signal economic downturns, recessions, or structural shifts within industries (Dosi, et al. 2018).

Studying employment trends also enables economists to assess the effectiveness of economic policies and interventions (Bahrom o'gli and Akmaljon o'gli 2023). By analyzing historical data and observing how employment responds to changes in monetary policy, fiscal stimulus, or regulatory measures, policymakers can fine-tune their strategies to achieve desired outcomes, such as full employment or price stability.

Furthermore, employment trends reflect broader societal changes, including shifts in technology, demographics, and globalization (Aggarwal 2011). The advent of automation, for example, has led to concerns about job displacement and the need for retraining programs to ensure workforce readiness in the face of technological advancements (Li 2022).

In addition to its practical implications, studying employment trends offers valuable insights into underlying economic dynamics and relationships. Econometric analyses of labor market data can uncover intricate patterns, such as the relationship between employment growth and Gross Domestic Product (GDP) expansion, the impact of education and skills on job prospects, and the role of labor market flexibility in promoting economic resilience.

Overall, a thorough examination of employment trends provides economists, policymakers, and stakeholders with essential information for understanding the current state of the economy, identifying emerging challenges and opportunities, and formulating strategies to promote sustainable growth and prosperity.

C. Purpose of the manuscript and its relevance to teaching macroeconomics

In addition to exploring the macroeconomic implications of the US employment deficit, this manuscript also highlights the significance of incorporating real-world economic data into the teaching of macroeconomics. As Adjunct Associate Professor and students at Spokane Falls Community College, Pullman Campus, we employ an innovative approach to teaching known as the Flipped Classroom model (Lencastre, et al. 2020, Cevikbas and Argün 2017, Ozdamli and Asiksoy 2016), facilitated through the Canvas Learning Management System (LMS). In this model, students are assigned readings from the macroeconomics textbook chapter (W. E. Schlosser 2023), and are required to watch pre-recorded YouTube lecture videos on the topic prior to class (W. E. Schlosser, Macroeconomics lectures on growth and understanding. 2017).

Upon entering the classroom, students engage in discussions to review the key concepts and insights gleaned from the assigned materials. One of the focal points of our discussions revolves

around the macroeconomic topic of employment numbers and their implications for GDP, wages, employment equity, and the study of unemployment rates (W. E. Schlosser, *Macroeconomics: Unemployment and Inflation* 2017). To facilitate hands-on learning, students are guided to access the US Bureau of Labor Statistics website, known as the Federal Reserve Economic Data (FRED) website, where they collect the PAYEMS dataset, providing monthly employment numbers dating back to 1939 (U.S. Bureau of Labor Statistics 2024). Additionally, students gather data on recessions, which are also incorporated into their analyses, all using Excel files.

Within the classroom environment, students utilize the free version of Microsoft Office downloaded on their local devices to manage and manipulate these datasets in Excel (Microsoft 2023). Through guided examples and exercises, students learn how to create visual representations of employment numbers and recessions, with employment depicted as a line graph and recessions as bar graphs, both within the same Excel figure. Furthermore, students are introduced to various trendline assessments available within Excel, culminating in the discovery of the Exponential trendline.

This analytical phase of the assignment allows students to explore the varying levels of fit between the trendline and the actual data, enabling them to identify disparities and consistencies within the dataset. By engaging in this hands-on approach to data analysis, students not only deepen their understanding of macroeconomic principles but also develop essential analytical skills that are crucial for interpreting real-world economic trends and phenomena.

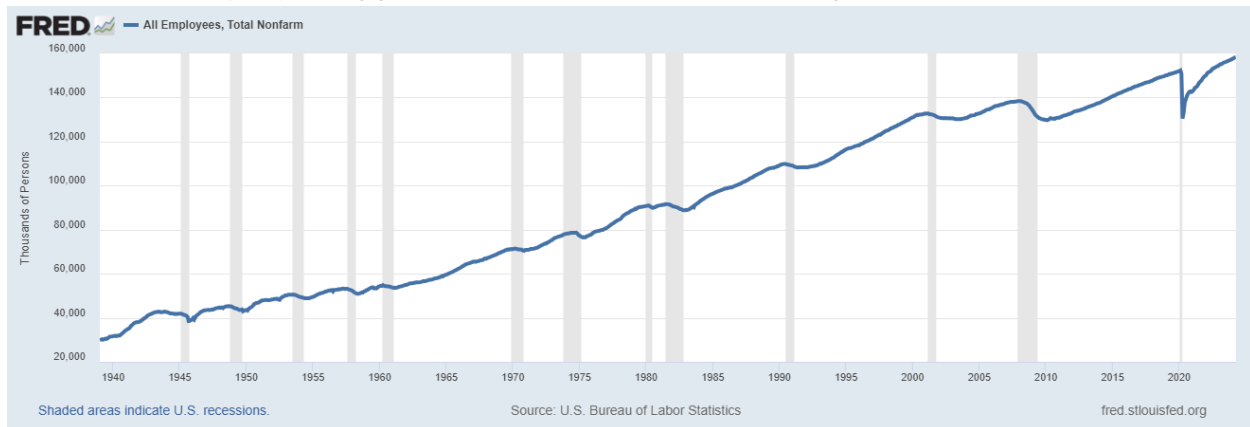
II. Background

In this section, we provide essential context and foundational knowledge pertaining to the datasets utilized in teaching macroeconomics. Comprehensive understanding of these datasets is crucial for both educators and students to effectively analyze economic trends and phenomena. We begin by exploring the historical context of US employment trends, followed by an introduction to key datasets, including those sourced from the U.S. Bureau of Labor Statistics (BLS) and the US Census Bureau. Through this background information, readers will gain insight into the significance of these datasets and their application in macroeconomic analysis and pedagogy.

A. Historical context of US employment trends

The examination of US employment trends requires a comprehensive understanding of the various measurements maintained by the BLS. These metrics serve as vital indicators of economic health and provide invaluable insights into the labor market dynamics. One such key metric is the "All Employees, Total Nonfarm" dataset, expressed in thousands of persons and adjusted for seasonal variations (Figure 1). This dataset, commonly referred to as PAYEMS, offers a detailed depiction of monthly employment figures dating back to January 1, 1939. The Federal Reserve Bank of St. Louis serves as the custodian of this invaluable repository of economic data, facilitating access to researchers and policymakers alike.

Figure 1. All Employees, Total Nonfarm Employment (Thousands of Persons, Monthly, Seasonally Adjusted) (U.S. Bureau of Labor Statistics 2024).



Throughout the extensive period covered by this dataset, spanning over eight decades, the US economy has experienced significant fluctuations in employment levels. An examination of the monthly additions to the workforce reveals an average of 125.47 thousand jobs created per month. This historical context serves as the cornerstone of our analysis, providing a solid foundation for exploring the underlying trends and patterns shaping the contemporary labor market landscape.

B. Introduction to datasets and their use in teaching macroeconomics

1. FRED data from the U.S. Bureau of Labor Statistics (PAYEMS)

In this section, we delve into the fundamental role played by datasets in enriching the learning experience in macroeconomics. A cornerstone of our pedagogical approach is the utilization of data sourced from the BLS, specifically the "PAYEMS" dataset available through the Federal Reserve Economic Data (FRED) platform. By leveraging real-world economic data, students gain firsthand exposure to the intricacies of labor market dynamics and develop a deeper understanding of macroeconomic principles.

Our classroom sessions are structured to empower students to interact directly with these datasets, allowing them to extract meaningful insights and draw connections between theoretical concepts and empirical evidence. Through hands-on exercises, students learn to navigate the FRED interface, access relevant data series, and utilize Excel tools to perform data analysis and visualization. By witnessing the process of data retrieval and analysis firsthand, students cultivate essential analytical skills and enhance their comprehension of economic phenomena.

Moreover, the incorporation of FRED data into our curriculum serves as a catalyst for student engagement and critical thinking. By exploring historical trends and contemporary developments in employment, students are encouraged to pose questions, formulate hypotheses, and conduct empirical investigations. This interactive learning approach fosters a collaborative classroom environment where students actively participate in knowledge creation and dissemination.

2. US Census Bureau population data

In addition to harnessing population data from the U.S. Census Bureau (2024), our analysis incorporates insights from multiple datasets, including CNP16OV (U.S. Bureau of Labor Statistics

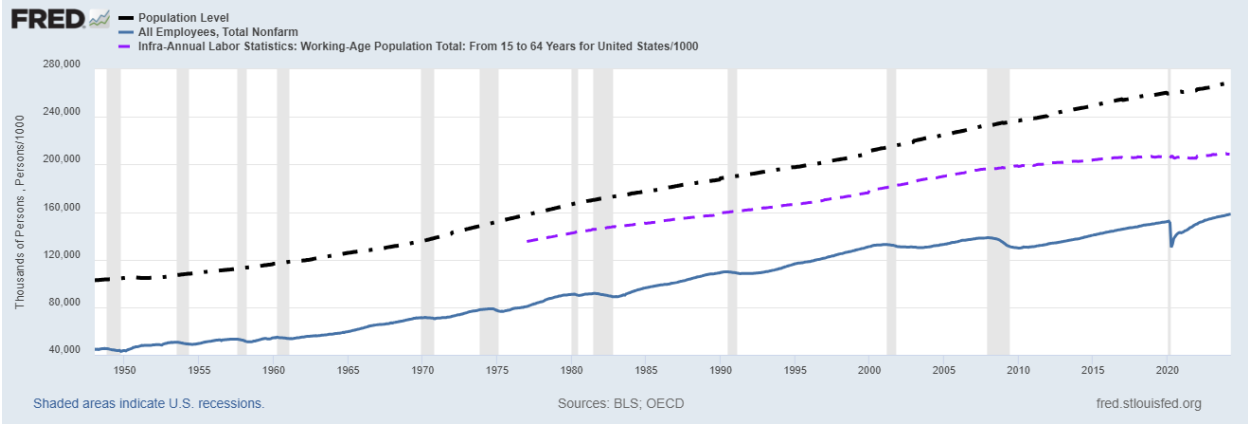
2024) and LFWA64TTUSM647S (Organization for Economic Co-operation and Development 2024). The integration of these datasets into our analysis illuminates the interconnectedness of various economic indicators and provides students with a holistic view of labor market dynamics.

Figure 2 depicts the juxtaposition of total population (CNP16OV), working-age population (LFWA64TTUSM647S), and the number of employed persons (PAYEMS). This integration enables students to observe the relationship between population demographics and labor market outcomes. By visualizing the total population alongside the working-age population and the employed workforce, students gain insights into the availability of labor resources relative to the total population.

The inclusion of these additional datasets highlights a key observation: despite fluctuations in employment levels, there is no inherent scarcity of employees within the population. Instead, variations in employment figures reflect complex dynamics influenced by factors such as labor force participation rates and demographic shifts (Figure 2). Through this analysis, students develop a nuanced understanding of the multifaceted nature of labor market dynamics and the factors driving employment trends.

By integrating multiple datasets and emphasizing the connectivity between them, our approach provides students with a comprehensive framework for analyzing labor market trends. This pedagogical strategy enhances students' ability to critically evaluate economic phenomena and fosters a deeper understanding of the interplay between demographic factors and labor market outcomes.

Figure 2. Population Level [CNP16OV], Intra-Annual Labor [LFWA64TTUSM647S], and PAYEMS (U.S. Bureau of Labor Statistics 2024, Organization for Economic Co-operation and Development 2024).



3. Other relevant datasets

Beyond FRED data and population statistics, our curriculum encompasses a diverse array of relevant datasets spanning various economic indicators and metrics. From GDP and inflation to consumer spending and international trade, students are exposed to a comprehensive suite of datasets that illuminate different facets of the macroeconomic landscape. By exploring these diverse datasets, students gain a nuanced understanding of the interconnected nature of economic variables and their implications for policy formulation and decision-making.

Through hands-on exploration and analysis of these datasets, students develop the analytical skills and critical thinking abilities necessary to navigate complex economic issues. Moreover, the integration of diverse datasets fosters interdisciplinary learning and encourages students to draw connections between economic theory, empirical evidence, and real-world phenomena. This multifaceted approach equips students with the tools and knowledge they need to excel in both academic and professional settings.

C. Previous research on US employment deficit and its implications for economic education

1. Overview of Existing Literature

a. Employment Policies

Von Wachter (2011) provides a comprehensive summary of recent research concerning the short- and long-term effects of job loss and unemployment, along with policy interventions aimed at mitigating these effects and stimulating job creation. The literature suggests that job loss and unemployment during economic downturns can impose significant and enduring costs on affected workers. While short-term interventions such as extending unemployment insurance can alleviate immediate burdens, addressing long-term costs and facilitating job creation present greater challenges.

Research indicates that cost-effective policies, such as job search assistance, can aid in the reintegration of long-term unemployed individuals into the labor market. However, mitigating long-term earnings losses remains a complex issue with fewer clear solutions. Additionally, evaluations of policies aimed at stimulating job growth yield varying estimates of effectiveness, highlighting the complexity of addressing unemployment at a systemic level.

Given the substantial long-term costs associated with layoffs and unemployment, Von Wachter emphasizes the importance of further research into preventive measures to avoid widespread job losses during future economic recessions. This underscores the need for continued investigation and development of policies aimed at both supporting unemployed individuals and fostering job creation.

b. Assessing the Depth and Systemic Nature of the 2009 Recession

Wind (2009) delves into the profound impact of the 2009 recession on unemployment, highlighting indicators that suggest a level of underemployment not seen since the Great Depression. The author emphasizes the significance of considering not only the unemployment rate but also the underemployment rate, which encompasses part-time workers and those experiencing reduced hours. The unprecedented proportion of workers facing long-term unemployment further underscores the severity of the current economic downturn.

The article posits that the underlying financial crisis extends beyond a typical recession and can be attributed to systemic issues within the banking sector, including a sharp credit contraction and preceding housing market instability. Wind predicts that if the crisis mirrors past credit crunches, the unemployment rate could peak at 11.5 percent, potentially leading to a vicious cycle of economic decline.

Moreover, Wind warns of the potential for a double-dip recession, citing factors such as ongoing foreclosures, diminishing impacts of stimulus programs, and the withdrawal of fiscal and monetary

stimuli. This assessment underscores the interconnected nature of economic factors and the potential for cascading effects on unemployment and overall economic activity.

c. *Evaluating the Impact of Technological Advances on Employment Dynamics*

In their article titled "The Rise of Technological Unemployment and Its Implications on the Future Macroeconomic Landscape," Kim, Kim, and Lee (2017) explore the profound impact of recent technological advancements on employment dynamics and macroeconomic trends. Through a comprehensive analysis of big data, machine learning, and robotics, the authors elucidate the disruptive effects of automation on traditional employment sectors.

The article begins with an examination of the shifting employment landscape, highlighting the significant decline in low- and medium-income jobs as a result of technological innovation. Drawing from seminal studies, such as Frey and Osborne's (2013) analysis, the authors underscore the urgency of addressing the challenges posed by technological unemployment.

Using an analytical model based on Markov chains, Kim, Kim, and Lee simulate future scenarios to assess the relative susceptibility of jobs to computerization. Despite the dystopian outlook portrayed by some forecasts, the authors argue that wholesale labor replacement by machines is unlikely to materialize in the foreseeable future. Instead, they advocate for proactive intervention policies, such as improved technical education and government interventions, to mitigate the adverse effects of technological change.

The article concludes with a call to action, emphasizing the importance of adequate preparation and policy interventions in navigating the transition to an increasingly automated economy. By offering a nuanced understanding of the complexities surrounding technological unemployment, Kim, Kim, and Lee's research contributes valuable insights to the ongoing discourse on the future of work and economic development.

d. *Dynamics of Labor Force Participation: Understanding Trends and Implications for the Economy*

Aaronson, Hu, Seifoddini, and Sullivan (2014), prepared "Declining labor force participation and its implications for unemployment and employment growth". They described the labor force participation (LFP) rate, which measures the proportion of the working-age population either employed or actively seeking employment, has experienced a notable decline from 66 percent at the onset of the Great Recession in December 2007 to 62.7 percent by September 2014. This decrease has raised concerns about potential labor market slack beyond what is indicated by the unemployment rate alone. The decline in the LFP rate can be attributed to several long-standing demographic trends, including the aging population, shifts in male and female participation rates, and changes in educational attainment.

By extending previous methodologies, the authors estimate that the actual LFP rate in late 2014 is 0.2 to 1.2 percentage points lower than what would have been expected before the recession, indicating potential additional slack in the labor market beyond what is suggested by the unemployment rate alone.

The analysis utilizes micro-level data from the U.S. Bureau of Labor Statistics' Current Population Survey (CPS) since 1982 to account for various demographic and cyclical factors influencing labor force participation. The findings suggest that despite changes in educational attainment and other socio-economic factors, the relationship between unemployment and LFP remains significant, with unemployment rates influencing participation decisions across different demographic groups. Properly controlling for unemployment stabilizes estimates of the trend LFP rate, highlighting the importance of considering both cyclical and structural factors in assessing labor market dynamics.

e. *Understanding the Natural Rate of Unemployment: Theoretical Debates and Empirical Challenges*

Dobrescu, Paicu, and Iacob (2011) delve into the theoretical and empirical implications surrounding the concept of the natural rate of unemployment. They trace the evolution of economic thought from the acceptance of A.W. Phillips' (1961) initial hypothesis to Friedman's introduction of the natural rate concept (Rubin and Goutsmedt 2018). The paper explores ongoing debates concerning the determination and variability of the natural rate, highlighting questions regarding its precise level and the factors influencing it over time. Despite extensive empirical studies, economists still lack a comprehensive quantitative understanding of the natural rate's determinants and variability across different contexts. The authors emphasize the importance of reconciling theoretical debates with empirical evidence to advance our understanding of this crucial economic concept.

f. *Understanding the Impact of the Shadow Labor Supply on the Unemployment Rate*

In the aftermath of the Great Recession (Frey and Osborne 2017), a notable phenomenon emerged: a surge in individuals who, despite desiring employment, ceased actively seeking it. This group, dubbed the "shadow labor supply," posed intriguing implications for the unemployment rate. While sharing similarities with the officially unemployed in demographics, their transition into active job seekers could potentially influence the unemployment rate's trajectory. However, statistical analysis suggests their impact may be modest due to small labor market flows from this group into unemployment. Historical trends further indicate diminishing transitions as economic expansion matures. Consequently, even under extreme scenarios, their influence on the unemployment rate is projected to be minimal. Instead, broader non-employed populations, encompassing those not seeking employment, may wield greater influence on unemployment rates, with potential variations of up to 1 percentage point. Sections within the study delineate demographic characteristics, flow rates, and forecasted unemployment rates, offering insights into the intricate dynamics of labor force participation.

g. *Cyclical and Secular Trends in U.S. Unemployment Duration: Insights from 1967 to 1998*

Valletta (1998) prepared "Changes in the Structure and Duration of U.S. Unemployment, 1967–1998" to describe how in the late 1960s, the U.S. economy witnessed its lowest unemployment rates, yet unemployment durations remained persistently long compared to previous expansions, aligning with a long-run trend identified by various analysts. Amidst the 1990s expansion, unemployment remained dominated by permanent job loss rather than voluntary job search or labor force entry decisions.

Valletta's study delves into the time-series properties of unemployment duration and incidence, exploring their interconnectedness. While the unemployment rate remains a primary labor market indicator, the distribution of unemployment durations offers nuanced insights into the nature of unemployment—whether it stems from voluntary decisions or persistent demand deficiencies. Understanding these dynamics informs appropriate macroeconomic policies to address unemployment. Additionally, fluctuations in unemployment durations have implications for unemployment insurance payments and shed light on secular trends in labor market slack associated with a given unemployment rate.

Valletta updates previous findings on the cyclical sensitivity of unemployment durations and examines secular trends in detail, emphasizing the link between reasons for unemployment and changes in duration. Drawing from data spanning from 1967 to May 1998, Valletta's analysis provides essential insights into the evolving landscape of U.S. unemployment, offering implications for macroeconomic performance and policy.

2. Analytical Frameworks and Prevailing Theories in Understanding Employment Dynamics

In exploring the complexities of employment dynamics, it is essential to draw upon established analytical frameworks and theories that provide insights into the underlying mechanisms shaping labor market outcomes. Several prevailing theories have been instrumental in guiding research and understanding employment trends. These frameworks offer valuable perspectives on factors influencing employment dynamics, such as labor force participation, unemployment rates, and structural shifts in the economy.

One notable framework is the Phillips Curve, which posits a relationship between inflation and unemployment (Phillips 1958). Initially proposed by A.W. Phillips in 1958, this concept suggests an inverse correlation between the two variables, implying that policymakers face a trade-off between reducing unemployment and controlling inflation. However, subsequent developments, including the emergence of stagflation in the 1970s, prompted revisions to the Phillips Curve and highlighted the importance of expectations and supply-side factors in shaping economic outcomes.

Another influential theory is the concept of the natural rate of unemployment, introduced by Milton Friedman in the 1960s (Friedman 1970). This theory contends that there exists a level of unemployment consistent with stable inflation, determined by structural factors such as labor market frictions and wage-setting mechanisms. Understanding variations in the natural rate of unemployment provides insights into the underlying health of the labor market and helps policymakers formulate appropriate monetary and fiscal policies.

Additionally, the analysis of labor force participation dynamics has been central to understanding employment trends (Blanchard, et al. 1990). Demographic shifts, changes in educational attainment, and evolving social norms all influence labor force participation rates, impacting overall employment levels and unemployment rates. Examining patterns of labor force entry and exit can reveal insights into underlying labor market dynamics and structural changes affecting employment outcomes.

By leveraging these analytical frameworks and theories, researchers can assess the complex interplay of factors driving employment dynamics. As we delve into our own analytical findings, we

will draw upon these established theories to contextualize our observations and identify potential implications for future pedagogical mechanisms.

3. Implications for Economic Education

Traditional pedagogical tactics for delivering economics education have evolved over time, incorporating technologies such as chalkboards, overhead projectors, PowerPoint presentations, and more recently, MP4 videos integrated into lesson plans. Despite these advancements, the conventional approach—reading a textbook chapter, discussing the material in class, and taking obligatory quizzes—remains pervasive. Progressive economics instructors, however, have sought to enhance student engagement by integrating mathematical calculations and analytical tools into their teaching methods. While these tactics are effective in achieving their intended goals, they often fall short of fully engaging the majority of students in a Fundamentals of Macroeconomics (ECON-202) course.

The rapid advancement of technology in recent years has created new possibilities for transforming education and empowering students (Petrie, et al. 2009, Schunk 2008, Higham 2001). However, the existing educational landscape often struggles to fully engage students and provide meaningful learning experiences (Powell and Kusuma-Powell 2011, Felder and Brent 2005, Barzun 1991). Traditional teaching methods often fall short in capturing students' attention and fostering deep understanding. Drawing upon previous research findings that highlight the potential of technology integration and video-based learning in enhancing student engagement and academic performance, this manuscript aims to build upon these foundations (Scott 2015, Illeris 2004, Felder, Woods, et al. 2000).

In live-class settings, a "flip-the-classroom" approach is harnessed (Strauss 2012). Before attending live classes, students are encouraged to engage with pre-recorded lecture videos (Mazur 1997). In-class activities then pivot towards discussions, experiments, and interactive learning experiences. This approach leverages class time for collaborative problem-solving, guided inquiries, and active explorations of complex topics. It empowers students to not just passively consume information but actively engage with it—a fundamental shift in the learning paradigm (Prince and Felder 2007).

At the heart of this pedagogical approach lies a commitment to student-centered learning and active engagement. This approach is firmly grounded in constructivist and experiential learning theories (Vygotsky 1978, Dewey 1938), which emphasize that learners actively construct their understanding of the world through their experiences. By placing students at the center of their educational journey, this framework empowers them to explore, analyze, and create knowledge actively.

A distinctive element is the requirement for students to complete a series of Term Reports, divided into three sections on a macroeconomic theme of their choosing. These reports are structured as professional documents, utilizing the "Document Mechanics" tools specific to Microsoft Word (W. E. Schlosser, Mastering MS Word: Style Sheets for Professional Documents 2023). Students are required to collect and integrate economic data from the FRED website into their analyses, forming the basis of their macroeconomic theses.

By leveraging current events and up-to-date data from the U.S. Bureau of Labor Statistics, students produce reports that reflect the mutable nature of economic conditions. This practice not only enhances their understanding of macroeconomic concepts but also equips them with the skills to identify and interpret meaningful data from reliable sources.

Moreover, students learn about the frictional form of unemployment, which arises from potential employees lacking the skills to use the necessary technologies for their positions. This understanding underscores the interplay between GDP growth and individual production functions, highlighting how advancements in technology require operators who are adept at utilizing these tools. The impact on employment growth and contributions to profitability are directly linked to the workforce's ability to adapt to new technologies.

The integration of "Document Mechanics" into economics classes fosters a philosophy of lifelong learning. These pedagogical strategies are not limited to macroeconomics but extend to all business-related studies, demonstrating the importance of continuously acquiring new skills for workplace applications and contributing to overall GDP growth.

Furthermore, this framework places significant emphasis on the development of critical thinking skills. These skills are essential for analyzing and evaluating information, solving problems, and making informed decisions—abilities that are invaluable not only in academia but also in navigating the complexities of the modern world (Halpern 2014, Paul and Elder 2006).

4. Student Perceptions

Student perceptions of these pedagogical tactics are eye opening to how these learning methods can encourage, bolster, and inspire student learning. In an interview conducted by Ane-Yaran Tanko, student of Spokane Falls Community College, Aidan Poppen, shares his insights on how his education was greatly improved by this methodology (Tanko 2024). Aidan is a student who experienced this approach of pedagogy for the first time in microeconomics and macroeconomics class, taught by Dr. Bill Schlosser.

Ane starts with a great question about student experience of a project of this nature. "Aidan can you share your experience working on this project and the insights you gained from your analysis?"

Aidan speaks about how the structure of this project helped him reach meaning full conclusions. "Dr. Bill first introduced us to the federal economic data on the FRED site and that's where all the data was. He ... taught us how to port that data to Excel, create charts, and how to produce them one student at a time. So that ... made the data more valuable because ... you're working with it, and you can ... have a better understanding of what's happening. So, with that we made the graph and then we made the trend line. The trend line is what really ... opened up our eyes to everything! Because there's just this huge deficit in employment and that's ... where we have these questions. Why is this happening? Why can't we see what we saw in the past? ... Through that we were able to find a lot of insights on things like the 2008 Great Recession, the 2020 COVID recession, and even some about immigration and the labor force stage."

It is clear the approach for students to collect their own data was very beneficial in this instance. Aidan, through self-discovery was able to find and understand the employment deficit. This insight

made him curious, and allowed the student to come to conclusions based on findings that came through a self-guided effort.

Ane's next question poses another great question, this time seeking to understand the impact and knowledge that can come from the flipped classroom approach and experiential learning. "So Aidan, can you elaborate on how the flipped classroom model and experiential learning approach influenced your research findings?"

Aidan explained how the flipped classroom and experiential learning approach influenced his understanding while working on projects. "The flipped classroom approach is ... where Dr. Bill assigns us ... a chapter to read . . . once a week ... and then you're watching the lecture video. For this project it was really helpful because we ... had that baseline info on ... what can happen within employment, ... the different types of unemployment, and other things that can affect unemployment levels. It was good to go into class having that knowledge because when we get this project, it's a project where we're at the experiential learning stage. It's hands-on and we're making the graph, and that's kind of where it all ties together. You ... have that background info and now that you have the data, you're creating questions for yourself that in turn you're you can go answer."

This answer shows just how close the flipped classroom and experiential learning approach tie together. Aidan was able to have a prior encounter with the topics in his research before even coming to class. When he got hands-on, the prior knowledge helped bolster his thinking on the topic, and created an inspired student who wanted to seek answers to the data presented.

Ane ends the interview with a very interesting question, seeking advice for other students looking to work on similar projects. "All right and lastly Aidan, what advice would you give to other students who might be interested in participating in similar research projects?"

Aidan expresses what he would advise other students to do given a similar project. "I think the biggest thing is just to stay super curious about what's happening and to just have a lot of fun with it! The way that the class is set up, you're really going in and getting your own data. ... It's kind of just an open world ... you've read the chapter you've seen what you know can impact these things. ... Have fun! It feels like you're just putting together a puzzle and working towards the answer."

Aidan expresses that other students should have fun and stay curious when working on research projects. With the flipped classroom approach he was able to gain insights on the topic beforehand and staying curious about that and the data presented led to a fun and inspired project.

5. Gaps and Future Directions

Despite the substantial body of research on the U.S. employment deficit and its macroeconomic implications, several gaps and areas for further exploration remain. Addressing these gaps can deepen our understanding of employment trends and enhance the effectiveness of economic education.

a. Identifying Gaps in Existing Literature

One significant gap in the current literature is the limited examination of the long-term effects of technological advancements on employment dynamics (Chatzoudes, Chatzoglou and Diamantidis 2022). While studies have analyzed the impact of technology on short-term job displacement (Idrisi, Geteye and Shanmugasundaram 2024), there is a need for comprehensive research on how

these changes affect the labor market over extended periods, particularly concerning the skills gap and retraining needs of the workforce.

Another area that requires further investigation is the influence of demographic shifts on employment patterns. As the population ages and workforce demographics evolve, it is crucial to understand how these changes affect labor market participation and unemployment rates. Research that explores the intersection of age, gender, race, and employment can provide valuable insights for policymakers and educators.

Additionally, there is a need for more detailed analysis of regional employment trends within the U.S. Labor market conditions can vary significantly across different states and metropolitan areas, influenced by factors such as industrial composition, economic policies, and local educational institutions. Investigating these regional disparities can help develop targeted strategies to address unemployment more effectively.

b. Proposing Areas for Further Research

Future research should focus on the long-term impacts of automation and artificial intelligence on various sectors of the economy. Understanding how these technologies reshape job roles and industries can inform workforce development initiatives and educational curricula, ensuring that workers are equipped with relevant skills for the future labor market.

Another promising area for research is the evaluation of policy interventions aimed at reducing unemployment. Studies that assess the effectiveness of programs such as job training, apprenticeships, and educational reforms can provide evidence-based recommendations for improving employment outcomes. Evaluating the impact of these policies on different demographic groups can also highlight ways to promote inclusive economic growth.

Moreover, interdisciplinary research that integrates economic theories with insights from sociology, psychology, and education can offer a more holistic understanding of employment dynamics. This approach can help uncover the underlying factors that influence labor market behavior and inform more comprehensive policy solutions.

c. Relevance for Economic Education Practices and Policies

The findings from future research can significantly inform economic education practices and policies. By incorporating insights from cutting-edge research into curricula, educators can better prepare students for the evolving job market. For instance, integrating modules on the economic impacts of technology, demographic changes, and policy interventions can provide students with a nuanced understanding of contemporary labor market challenges.

Furthermore, developing pedagogical methods that emphasize data literacy and analytical skills can enhance students' ability to engage with current economic issues critically. Encouraging students to undertake independent research projects and analyze real-world data can foster a deeper appreciation of economic complexities and improve their problem-solving abilities.

In conclusion, addressing the identified gaps and pursuing the proposed research directions can enrich our understanding of employment trends and enhance the quality of economic education. By staying attuned to the evolving landscape of the labor market, educators and researchers can

equip students with the knowledge and skills needed to navigate and contribute to a dynamic economic environment.

III. Methodology

A. Classroom Activity: Collecting and Analyzing PAYEMS Data

In this section, we outline detailed classroom activities designed to engage students in hands-on data collection and analysis, leveraging the capabilities of the FRED website and Microsoft Excel. This activity not only enhances their understanding of macroeconomic concepts but also equips them with practical skills in data analysis and visualization.

B. Activity Overview:

1. Introduction to PAYEMS Data:

Objective: Introduce students to the concept of PAYEMS (Total Nonfarm Payroll Employment) data and its significance in economic analysis.

Task: Students are tasked to visit the FRED website and collect PAYEMS data. The instructor demonstrates how to navigate the site, locate the PAYEMS data series, and download the data in Excel format.

2. Data Collection and Initial Analysis:

Class Demonstration: The instructor shows how to download PAYEMS data and explains the importance of different time periods, particularly focusing on the impact of recessions on employment numbers.

Student Task: Students download the PAYEMS data to their local Excel files and also capture the corresponding recession data from FRED.

3. Data Integration in Excel:

Combining Data: Students are guided on how to merge the PAYEMS data and recession data into a single Excel workbook.

Creating Visualizations: Using Excel, students create a line graph for PAYEMS data and overlay bar charts to represent recession periods. This integrated visualization helps in understanding the correlation between recessions and employment trends.

4. Analysis and Interpretation:

This section analyzes employment trends in the United States using an exponential trend line and integrates insights derived from student assignments in the ECON-202 Macroeconomics course. These insights highlight the diverse factors contributing to the U.S. job deficit and demonstrate the effectiveness of experiential learning in enhancing students' understanding of macroeconomic concepts.

a. *Trend Line Analysis*

To understand long-term employment trends, we employed an exponential trend line using data from January 1, 1939, to April 1, 2001 (Formula 1). This period was chosen for its representation of consistent economic growth, providing a reliable baseline for our analysis.

Formula 1. Exponential trendline projection (U.S. Bureau of Labor Statistics 2024).

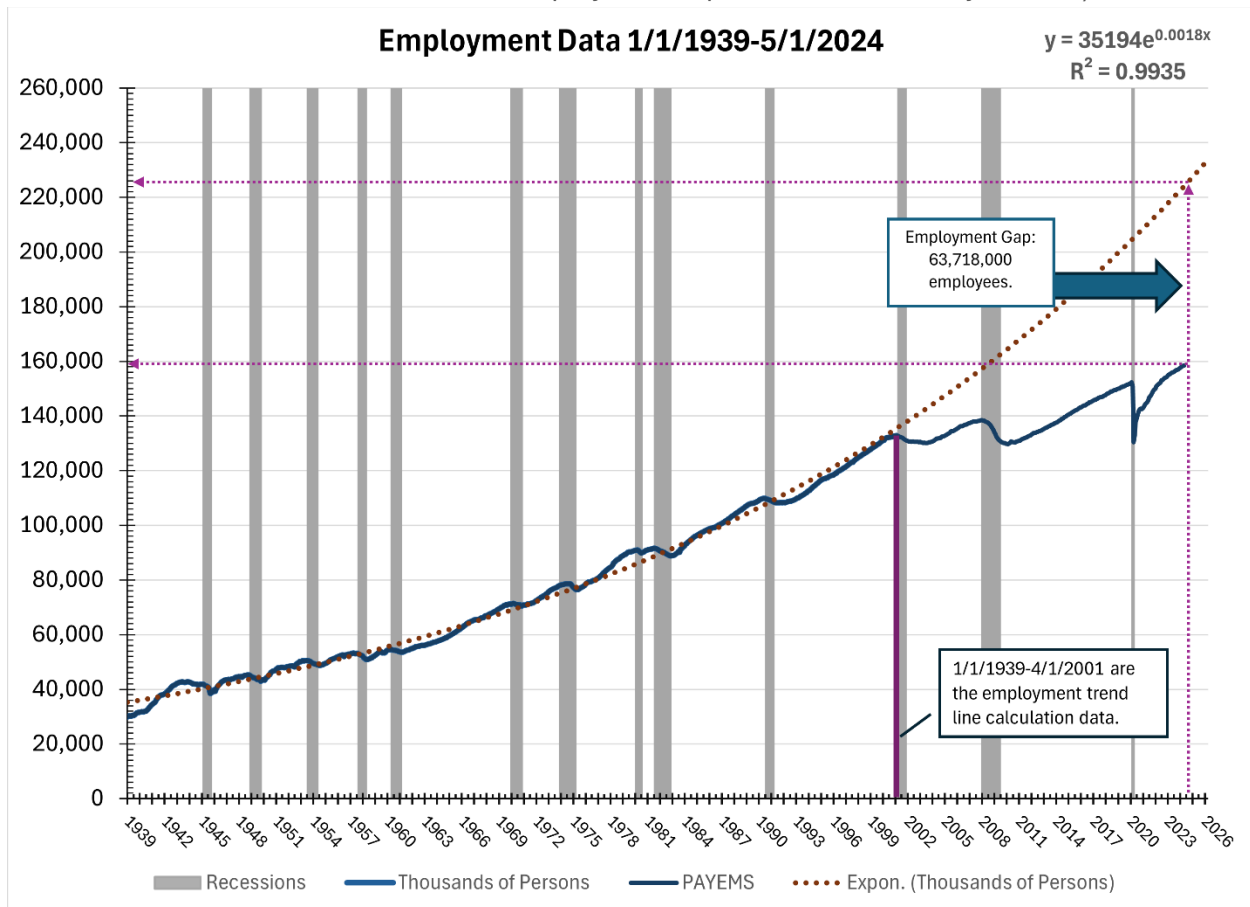
$$y = 35194 \times e^{0.0018x}$$

$R^2 = 0.9935$, $y = \text{PAYEMS estimate by month}$, $x = \text{number of months since 1/1/1939}$

b. *Exponential Trend Projection*

We extended this trend line to forecast employment levels through April 1, 2024. The projection reveals a significant divergence between the expected employment levels and the actual employment data post-2001. This gap, evident in Figure 3, poses a critical question: why is there a job deficit?

Figure 3. Trendline projection of US Employment levels, 1939-2024 (U.S. Bureau of Labor Statistics 2024, W. E. Schlosser, Employment Exponential Trend Analysis 2024).



As shown in Figure 3, the actual job report for May 1, 2024, indicates 158,543 thousand workers, while the trendline projection suggests there should be 222,311 thousand workers. This reveals a deficit of 63,768 thousand workers. For students in the class, this striking revelation is further compounded by the fact that the unemployment rate at this time is 3.9% (U.S. Bureau of Labor Statistics 2024). This paradox prompts students to investigate deeper into the categories of discouraged workers and those truly out of the workforce. These categories existed in the trend analysis data array before 2001, so the question arises: why is the divergence so much more significant now?

c. *Understanding the Job Deficit*

To explore the reasons behind this job deficit, we turn to the analyses conducted by students in the ECON-202 Macroeconomics course. Their work provides valuable insights into the factors contributing to the discrepancy between projected and actual employment levels.

1. Economic Recessions

Several students, including Chase Urquhart and Aidan Poppen, identified major economic recessions, such as the Great Recession of 2008-2009 and the COVID-19 recession of 2020, as critical periods contributing to job deficits (Figure 1). These recessions caused significant disruptions in employment levels, with long-lasting effects on job recovery.

From 2001 to 2003, actual job numbers fell slightly before beginning to climb again, roughly at the pace of the trend line (Figure 3). As the U.S. economy approached 2008, the expansionary motif prevailed, but employment levels did not show a significant peak. Instead, they moderately increased at a decelerating rate until the Great Recession began. Employment numbers then dropped significantly, until moderate growth restarted in 2009. From 2009 to the onset of the COVID-19 recession in 2020, job numbers increased at a rate less than the trendline projection rate of increase.

2. Technological Advancements and Workforce Mismatch

One critical factor identified by students is the mismatch between technological advancements and worker skills. In 2001, the expansion of the internet and the online marketplace led to the displacement of traditional sales workers who lacked the skills to navigate the new digital landscape. This period marked the transition of the U.S. economy from goods production to services, with a new understanding of what "services" entailed. Workers who could not adapt to new technologies, such as coding web pages or virtually greeting customers, were left behind.

3. Globalization, Outsourcing, and Structural Shifts in the Economy

The increasing globalization of trade and the outsourcing of jobs to countries with lower labor costs have significantly impacted employment in certain sectors within the U.S. Manufacturing jobs (Harrison and McMillan 2006), in particular, have been outsourced to countries where labor is less expensive, resulting in domestic job losses (Bhagwati, Panagariya and Srinivasan 2002). This trend has led to a broader structural shift in the U.S. economy, transitioning from manufacturing to service-based industries.

In class, student teams worked collaboratively on challenges related to GDP, personal production function modifications, and labor force participation. They explored the impacts of international competition, linking these to GDP components and changes in expense categories such as shipping and equipment purchases. This hands-on approach helped students understand how the outsourcing of jobs and the bifurcation of imports and exports affect the U.S. economy.

Through their analyses, student teams revealed that the number of U.S. employees drops significantly due to these shifts. They examined the effects on the GDP, highlighting how international trade and outsourcing contribute to a significant loss in US employment. By dissecting the GDP components, students were able to articulate the broader economic implications, such as

increased equipment and shipping costs, which further accentuate the reduction in domestic employment.

Aidan specifically discussed how businesses moved production overseas to reduce costs, impacting domestic employment. The transition from manufacturing to service-based industries has resulted in a mismatch between the skills of the existing workforce and the demands of the new job market. This mismatch highlights the challenges workers face in adapting to new economic realities brought about by globalization and structural shifts.

4. Policy Impacts

Government policies, such as fiscal stimulus measures and labor market regulations, have also influenced employment trends (Nickell and Layard 1999). Chase examined how policies aimed at stimulating economic growth or protecting workers' rights contributed to job deficits during specific periods. Aidan highlighted the impact of immigration policies and undocumented workers on employment statistics.

5. Demographic Changes

Demographic changes, such as aging populations and shifts in labor force participation rates, have altered the supply and demand dynamics in the labor market (Börsch-Supan 2003). Chase discussed the significant increase in Baby Boomer retirements and the rising workless rate among working-age men. Aidan further explored how the aging labor force has contributed to the current job deficit.

6. Personal Production Function

A key concept discussed in the classroom is the Personal Production Function, which highlights the employee's competence in using existing technologies (Colombo and Grilli 2005). Many of these technologies have been refined to increase productivity. Although new technologies are often heralded as the next stage of advancement, better utilization of existing technologies can lead to higher proficiency and greater production without a corresponding increase in employment levels. This suggests that the productivity gains achieved through enhanced technology use may contribute to the job deficit by allowing firms to produce more with the same or fewer workers (Quinn, Baruch and Paquette 1987).

In class sessions, students often arrived at these realizations through discussions and collaborative projects, sometimes incidentally to the direct topic of employment. The interconnections between various economic concepts became evident as they explored how enhanced productivity through existing technologies could impact job numbers. Through this pedagogical approach, students were able to link the theoretical aspects of the Personal Production Function with practical examples, thereby deepening their understanding of the broader economic implications. Chase, in particular, made significant contributions by linking these theoretical aspects with practical examples.

Class activities often involved analyzing case studies and data sets that illustrated the impact of technology on productivity and employment. By working through these real-world examples, students could see firsthand how improvements in technology utilization could lead to higher output without increasing the workforce. Aidan made notable connections between these

improvements in technology utilization and the resulting higher output, highlighting the complexity of employment trends and the multifaceted nature of job deficits in the modern economy.

7. Education and Skill Gaps

The mismatch between the skills required by modern jobs and those possessed by the workforce can lead to unfilled positions and, consequently, a job deficit. Rapid technological changes often require new skills that the existing workforce may not possess, leading to structural unemployment (Apergis and Apergis 2020). This issue is further compounded when college graduates enter the workforce without the necessary training in technologies that have been available for years or even decades.

In classroom discussions, students often reflected on the challenges of structural unemployment. They noted that the development of new technologies outpaces the training provided, both in educational institutions and within companies. Informally, students expressed concerns that their professors might not always be at the cutting edge of new developments, affecting their preparedness for the job market.

During team presentations, students addressed these challenges and emphasized the importance of internships to bridge the skills gap. By gaining practical experience, they believed they could better prepare for the technological demands of the modern workforce. Two student teams, in particular, highlighted the critical role of internships in ensuring they acquire relevant skills and experience before graduation, thereby mitigating the risk of entering the workforce unprepared.

8. Discouraged Workers and Workforce Participation

Students delved into the category of discouraged workers—individuals who have stopped looking for work because they believe no jobs are available for them. This category, along with those truly out of the workforce, has become increasingly significant in recent years. While these categories existed before 2001, their impact on the labor market has grown, suggesting structural changes in the economy and shifts in workforce participation dynamics.

d. Inferences

The gap between the projected exponential trend line and actual employment levels since 2001 underscores the multifaceted nature of the job deficit. The insights presented here, derived from student analyses, demonstrate the analytical capabilities developed through the ECON-202 course and provide a rich understanding of the factors contributing to job deficits in the U.S. economy. These student-driven analyses offer a comprehensive view of the challenges facing the U.S. labor market and potential pathways to address them.

IV. Discussion

A. Interpretation of Findings and Their Educational Significance

1. Insights Gained from Student-led Analysis and Interpretation

Engaging students in real-world data analysis has significantly enhanced their understanding of macroeconomic concepts. Through this experiential learning approach, students have developed essential skills such as data literacy, analytical reasoning, and the ability to interpret complex

economic trends. These skills are crucial for their academic and professional development in the field of economics.

2. Implications for Teaching and Learning Macroeconomics

The integration of student-led research projects into the macroeconomics curriculum has shown to improve student engagement and learning outcomes. By making abstract economic theories more tangible and relevant, this approach helps students better grasp the complexities of the subject. Other educators can apply these methods to various economic courses, fostering a more interactive and participatory learning environment.

B. Reflections on Pedagogical Approaches and Student Engagement in Research

1. Benefits of Experiential Learning and Student-Centered Research Projects

The benefits of experiential learning and student-centered research projects are evident in the increased student motivation, deeper understanding of economic principles, and improved academic performance observed in the course. Students have expressed that this hands-on approach has made the learning experience more engaging and meaningful.

2. Challenges and Opportunities for Integrating Research into the Curriculum

While integrating research into the curriculum presents challenges such as resource constraints and varying levels of student preparedness, these can be addressed through careful curriculum planning and institutional support. Opportunities for pedagogical innovation arise from these challenges, allowing educators to develop more effective and engaging teaching methods.

C. Future Directions for Incorporating Research-Based Pedagogy in Macroeconomics Education

1. Strategies for Enhancing Student Involvement in Research Activities

Educators can enhance student involvement in research by incorporating research components into regular coursework, offering independent study opportunities, and facilitating collaborative research projects. Encouraging students to present their findings at academic conferences and publish their work can further motivate them to engage deeply with their research.

2. Suggestions for Curriculum Development and Pedagogical Innovation

Curriculum development should focus on integrating research-based pedagogy into macroeconomics education. Designing courses that emphasize data analysis, critical thinking, and real-world applications of economic theories can significantly enhance student engagement and learning outcomes. Pedagogical innovations, such as flipped classrooms and problem-based learning, can further support this goal.

V. Conclusion

A. Summary of Key Findings and Their Educational Value

The analysis of employment trends and the job deficit, combined with student-led research, has provided valuable insights into the complexities of the U.S. labor market. This research underscores

the educational value of engaging students in hands-on data analysis and interpretation, enhancing their understanding of macroeconomic concepts.

B. Contributions to the Field of Macroeconomics and Economic Education

This manuscript contributes to the field of macroeconomics by providing a comprehensive analysis of employment trends and the job deficit. Additionally, it highlights the effectiveness of research-based pedagogy in economic education, offering a model for integrating research into the curriculum.

C. Implications for Policymakers, Educators, and Researchers

The findings have significant implications for policymakers, educators, and researchers. Policymakers can use these insights to inform labor market policies and interventions. Educators can adopt the pedagogical approaches described to enhance economic education, while researchers can build on this work to further explore the factors influencing employment trends.

D. Closing Remarks on the Importance of Integrating Research and Pedagogy in Economics Education

Integrating research and pedagogy in economics education is crucial for developing students' analytical skills and fostering a deeper understanding of economic concepts. By engaging students in real-world research, educators can create a dynamic learning environment that prepares students for future academic and professional success. The collaborative efforts showcased in this manuscript highlight the potential for innovative educational practices to transform economic education.

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