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Game theory between the labor force and capital: Macro-Micro Labor-Boss Model

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ABSTRACT

Game theory is an important branch of economics that focuses on standardizing psychological factors. Using theoretical models and observed data, it guides the analysis along a set path to predict how events might unfold. Before exploring the strategic interactions between labor and capital, it is essential to understand both macro & micro-economic conditions and situations. Historically, macroeconomics and microeconomics have developed separately, with limited coherence and connection. However, in real-world applications, these fields often interact, as seen in pricing mechanisms (micro) and currency management (macro). Both areas draw on theories from micro and macroeconomics and involve studies related to the labor force. In this research paper, we aim to introduce a new idea about how labor and bosses interact during fluctuations in macroeconomic conditions. We also want to present a new perspective on the relationship between labor and bosses. This research paper seeks to bridge-the-gap between macroeconomic and microeconomic theories.

KEY WORDS: psychological factors, strategic interactions, labor and capital, macroeconomic and microeconomic theories.

Introduction

Game theory is one of the important branches in the field of economics. Its essence lies in the standardization of psychology. Through theoretical hypothesis models and observed results, it can be put into a preset track to predict the outcome of the development of events.

Before discussing the game relationship between labor and capital, we have to talk about the macro and micro theories of economics. Economics has always struggled to integrate macroeconomics and microeconomics, resulting in the independent development of each field. There is not only little coherence between them, but also a lack of connection. However, in real-life applications, they often not only exist independently, but are often interrelated, such as in pricing mechanisms (micro) and currency use (macro). They all involve theories of microeconomics and macroeconomics, not to mention the study of the labor force.

Methodology

Analyzing the labor force in a game theory context involves modeling interactions among workers, employers, and possibly unions as strategic players. Initially, we identify the players, their strategies, and payoffs that represent labor market results such as wages, employment, or productivity. By employing both cooperative and non-cooperative game theory models, we examine scenarios involving negotiation, competition, and collaboration. Information on labor supply, demand, and potential outcomes helps

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shape the payoff structures. Equilibrium concepts are then applied to forecast stable strategy profiles. Computational tools and sensitivity analysis assess the robustness of these equilibria under various economic conditions. We will utilize the Labor report from OECD, and the various Labor condition papers from Google Scholar in the years from 2010 to 2025, in order to pave the way in the analysis process, which can help us find an interpretation of the boss-labor interaction.

Literature Review

Game theory provides a vigorous framework for examining strategic interactions within the labor market, where decisions by employers and employees shape wages, employment levels, and productivity. Numerous studies [1][2][3][4] have employed conflict-based models to explore wage bargaining, job search strategies, and contract formation. Yet, game theory is infrequently used to explain these phenomena. For instance, bargaining models illustrate how negotiation dynamics impact wage agreements and labor contracts. Moreover, research [5][6][7][8] shows that signaling and screening games account for how information asymmetry influences hiring decisions. Recent studies also integrate conflict states to analyze long-term employment relationships and incentives [9][10][11]. Overall, game theory offers valuable perspectives on labor market processes by highlighting strategic behavior and supporting policy development for wages and employment regulation. In addition, the above Studies will provide us with a strong indication to support our new model postulation.

Discussion and Insight

Research topics on the labor force mainly focus on its education level, re-employment mechanisms, and contract system formation, but rarely address games. Additionally, many studies on the labor force, similar to those in economics, discuss the game between workers and the factory (capital). As a result, many theories involving labor are incomplete and often avoid economic theories and linking the labor force with macroeconomic relationships. The development trend of this research is worth reflecting on. [1][2].

When discussing the labor wage pricing mechanism, we need to consider the factory (capital). Although in a modern free-market economy, labor has free choice and can select occupations and wages freely, in reality, the factory (capital) controls the wage-setting power, and labor rarely has a say. According to social norms, most people are passive in choosing their occupations. Due to limitations such as education, school options, family factors, and other influences, individuals are often involuntarily led to select their careers. A substantial amount of literature confirms that education is key to career choice. They are crucial to career decision-making, and there is significant literature supporting the discussion on education skills. This article will not delve into those details [1][2][3]. Instead, it aims to explore the wage pricing mechanism of the factory (capital), along with its interaction with the labor force, as an effort to better connect macroeconomic and microeconomic theories.

As the name suggests, the employer has control over wages, making it a price-taker. Of course, some people may object to this view and believe that the market is free and does not involve a monopoly.

However, when we analyze regional economies, we find that many countries rely heavily on a single industry, such as Finland with Nokia mobile phones. Between the 1990s and 2000s, their industrial chains contributed to half of their GDP. This indicates that wages tend to be very uniform and can be easily controlled by monopolies.

Even if a country has different industrial sectors, these sectors tend to lack diversification. For instance, in the past, Detroit, a city known for the American automobile industry, mainly developed around automobile manufacturing. Most workers in this area were involved in building cars. This shows that with the formation of this industrial economic circle, an industrial ecological chain emerges, effectively creating a monopoly that controls wage levels.

Between countries and regions, there are comparative advantages, but the industry is more straightforward. The long-term outcome of a simple industry is to cut costs to the limit to maximize profits, and wages are no exception. Motivated by this, the factory must keep wage costs low while trying to maximize profits. In many cases, the workers have little say in the matter.

Therefore, when a factory is part of a single industry circle, it can establish a monopoly on wage pricing. Under single-industry conditions, the factory (capital side) can easily manipulate prices.

Many studies [4][5][6] have also clearly shown that there is a significant gap between the rich and the poor in societies around the world. Most of this divide is caused by the underestimation of wages. When wages cannot keep up with rising prices, there is a high chance that real wages will decrease, creating a vicious cycle.

Due to the numerous technology and patent monopolies held by factory owners (employers), as well as the manipulation of wages by convention in the industrial circle, this has caused a significant decline in the wage level for labor.

As a result, management and labor often engage in games over wages, costs, etc. The games between labor and management often bring about (Dead Weight Loss). Research also shows that employers rarely make concessions on wages. [7][8][9]. The long-term decline in wage levels and prices has contributed to the widening gap between the rich and the poor and the changing social atmosphere. Of course, this article mainly uses games to discuss the power of pricing briefly.[10][11].

Therefore, we will focus solely on game theory as a behavioral analysis of labor and management. The core of game theory is the prisoner's dilemma, where both sides interact offensively and defensively within limited conditions, and each side's offense is also a form of defense. For example, labor expresses dissatisfaction through strikes, while management often manipulates interactive factors like wage levels to create game models. In many cases, management clearly holds an advantage over labor.

Game model between labor and capital:

Table 1: Game Model 1

Labor （0，0）	Capital （5，0）
Capital （5，5）	Labor （0，5）

Table 2: Game Model 2

Labor, Capital （0，0）	Labor, Capital （5，5）
Labor, Capital （5，5）	Labor, Capital （30，30）

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But sometimes labor clearly puts pressure on the employer. For example, long-term strikes have a certain impact on the competitiveness of the employer, prompting a certain increase in wages. A more famous example is Poland. Poland used to be an industrial center in Europe. They are mainly composed of medium-sized frames, steel manufacturing, and other medium-sized industries. However, in the 1960s and 1970s, there was a sustained labor movement in Poland. The labor movement weakened the competitive advantages of capital. The long-term labor movement even plunged Poland into a long-term economic trough, causing a large number of people to migrate to wealthier regions/countries. As a result, Poland not only lagged behind in development but also experienced a longer-term economic recession. This was an example of a game between labor and capital that hurt both sides, and ultimately caused the dissipation of rental value and heavy losses to society.

Macro	Micro
Economics Situation	Pricing
Collusion	Price Discrimination
Involvement	Monopoly

Table 3: Macro-Micro Labor-Boss Model

This table illustrate the condition sate between the change in the macro-economic and the micro economics, when the economics conditions in turmoil, the macroeconomics condition will worst off, so does the boss capital earning, this will certainly harm to the worker of the labor force, provide an laid ground condition, of future conflict inducement, also, when the industry is in highly concentrate monopoly condition, the labor bargaining power will be worst off, since no one will hired in the other company when there is just one company in the whole world. In addition, when firms collude, their collective bargaining power worsens, potentially affecting labor livelihood. It potentially threatens the labor workforce to shut up, so the overall bargaining power will be worse off, while the condition of the macro economy is at its worst.

However, there is also a situation where gambling can lead both parties to a win-win outcome, meaning that wages can be significantly increased and profits can be made, thereby helping the industry to upgrade and transform. One key aspect is transforming knowledge into industry through internalization, allowing workers' knowledge to be industrialized for upgrading, transformation, and development. Enterprises can leverage employees' knowledge to enable them to start businesses and develop independently. By providing space and flexibility to create conducive conditions, this approach can reduce enterprise risks and also offer employees a living space and flexibility. Therefore, flexibility is the core of the game discussed in this article, with its mechanism based on the interactive growth between labor and capital, leading to transformation and sustainable development. Enterprises create space and conditions to foster flexibility and achieve a win-win situation. This represents a positive interaction between enterprises and labor and management for long-term growth.

That's why there is a scenario illustrates a synergistic framework in which gambling functions as a catalyst for mutually reinforcing economic benefits, fostering both wage growth and profit accumulation. By leveraging internalization strategies, knowledge transfer is institutionalized, enabling the codification of workforce expertise into scalable industry assets that drive technological upgrading, innovative transformation, and sustained development. Enterprises can harness human capital by facilitating entrepreneurial initiatives and enabling small and medium-sized enterprises (SMEs) to achieve autonomous growth trajectories. Creating a conducive environment characterized by organizational flexibility and operational fluidity mitigates firm-specific risks while simultaneously providing employment stability and enhancing labor market adaptability. This dynamic interaction underscores the importance of labor-capital symbiosis, where flexible organizational structures underpin regenerative growth cycles. Consequently, enterprises cultivate institutional conditions that promote organizational agility, resulting in a positive feedback loop that benefits all stakeholders-enterprise, labor, and management thus aligning short-term operational efficiencies with long-term sustainable development objectives.

In conclusion

Game theory is a key part of economics, focusing on modeling strategic interactions among rational agents. It analyzes cognitive and behavioral factors that influence decisions. Using models like non-cooperative and cooperative games, along with data and observed behaviors, it helps researchers and policymakers predict economic and strategic outcomes. Our Macro-Micro Labor-Boss Model framework derives an equilibrium perspective and offers insights into behavior in competitive and collaborative settings. This research paper aims to introduce a new perspective on how labor and bosses interact during fluctuations in macroeconomic conditions. Additionally, our research paper hopes to bridge the gap between macroeconomic and microeconomic theories, offering fresh insights into the relationship between labor and management. We hope this paper can benefit mankind and the world.

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