Wage-Price-Spiral or Price-Wage-Spiral?

Evidence From Two Behavioral Experiments and Conclusions for the Central Bank

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Abstract

Does a wage–price or price–wage spiral exist, and what are its implications? This issue has been investigated in two behavioral experiments. The findings indicate that both dynamics are possible: prices may rise first, triggering wage increases that subsequently push prices even higher, or wages may increase initially and thereby fuel inflation. Inflation erodes the real purchasing power of wages, generating distributional effects in which employees suffer real income losses while firms benefit. This redistribution raises labor demand, consistent with the Phillips curve framework. To mitigate these distributional effects, the central bank should pursue a more restrictive monetary policy in the case of a price–wage–price spiral than in a wage–price–wage spiral. In contrast, the application of similarly restrictive measures in a wage-price-wage spiral carries the risk of an increase in unemployment and corporate insolvencies.

Keywords: monetary policy, monetary business cycles, behavioral modeling, wage-price, price-wage spiral, labor market, wage policy, Phillips curve

JEL classification: E 43, E 47, E 58

1. Introduction

It is commonly argued that a tight labor market, driven by expansionary fiscal and monetary policies, leads to wage inflation, which subsequently translates into price inflation (Lorenzoni & Werning, 2023). The economic logic underlying the wage–price spiral rests on a conflict between workers and firms over the real wage, defined as the ratio of nominal wages to prices (W/P). Firms set nominal prices to achieve a targeted real wage, while workers seek nominal wage adjustments to secure a higher real wage. This mismatch generates nominal escalation, resulting in inflation in both wages and prices (Lorenzoni & Werning, 2023). Alvarez et al. (2022) characterize a wage–price spiral as a period in which consumer prices accelerate and nominal wages increase in at least three out of four consecutive quarters. However, price–wage spirals may also arise when workers raise wage demands in response to inflation-induced losses in purchasing power. This raises several key questions: Does a wage–price or a price–wage spiral prevail? How do workers and firms interact dynamically in setting wages and prices? And what are the resulting economic consequences? These questions are examined using a behavioral economics approach. The paper proceeds as follows: Section 2 reviews the relevant literature, Section 3 outlines the experimental design, Section 4 presents the results, and Section 5 concludes.

2. Related Literature

The literature does not provide a clear distinction between wage–price spirals and price–wage spirals (Alvarez et al., 2022). According to Blanchard (1986), workers aim to preserve or increase real wages, while firms seek to maintain or raise markups over wages. Because nominal wages and prices adjust with delays, inflationary shocks dissipate only gradually as workers and firms renegotiate wages and prices over multiple rounds. Some researchers interpret the wage–price spiral primarily as a mechanism that prolongs inflation rather than accelerates it (Zeira, 1989; Helpman & Leiderman, 1990; Ball, 1994; Musy & Pereau, 2010). In contrast, recent contributions (Blanchard, 2022; Boissay et al., 2022) emphasize the risk that rising wage inflation could act as a new cost-push shock for firms, potentially

accelerating inflation in the short run. Empirical evidence, however, suggests that only a small fraction of wage–price spiral episodes result in sustained increases in both wages and prices. More commonly, inflation and nominal wage growth stabilize, leaving real wage growth largely unchanged, with nominal wage increases aligning with observed inflation. In episodes resembling recent developments—characterized by declining real wages and tightening labor markets—inflation has tended to fall while nominal wage growth has risen, enabling real wages to recover to previous levels (Alvarez et al., 2022). A price–wage–price spiral would therefore imply persistent declines in real incomes and provide support for the Phillips curve relationship. After episodes like the post-COVID recovery, inflation tended to fall while wages rose, allowing real wages to catch up. Alvarez et al. (2024) conclude, that overall, rising wages during high inflation do not necessarily mean a persistent wage–price spiral.

The original Phillips (1958) curve, developed in 1958 using UK data from 1861 to 1957, depicted an inverse relationship between average nominal wage increases and the unemployment rate. Samuelson and Solow (1960) later adjusted this relationship to focus on inflation and unemployment. Friedman (1968) and Phelps (1968) demonstrated that this association does not hold in the long run, implying that the Phillips curve becomes vertical over time. It is now widely accepted that central banks can only influence non-structural unemployment, as monetary policies that attempt to go beyond this tend to generate inflation without reducing unemployment (Zanetti, 1998).

Numerous empirical studies have been conducted on the Phillips curve. For instance, King (1994) identified a negative correlation between inflation and unemployment during economic cycles and a long-term trade-off for the post-war United States. The shape of the Phillips curve has also been extensively examined. The original Phillips (1958) curve was concave, reflecting an inverse relationship between wage growth and unemployment. There has been debate over whether the curve is linear or concave, with differing results stemming from the use of various econometric methods, even though studies primarily focused on the U.S. economy. Gordon (1998), Staiger, Stock, Watson (2001), and Eliasson (2001) support a linear interpretation of the U.S. Phillips curve, while many others argue that the curve is concave (e.g., Clark, Laxton & Rose, 1996; Akerlof & Yellen, 2006; Stiglitz, 1997; Eisner, 1997; Stimel, 2009).

Russell and Banerjee (2006), analyzing U.S. data from 1952 to 2004 and accounting for a non-stationary inflation rate, concluded that there is a significant positive relationship between inflation and unemployment. However, they also found that rising inflation diminishes the short-term trade-off between the two, effectively weakening the Phillips curve. Their findings confirmed that in the long run, the Phillips curve is vertical and suggested that inflation can negatively impact employment; specifically, a 5% increase in inflation could lead to a 1.5% rise in unemployment over time. Despite these insights, econometric research faces challenges, as conflicting conclusions have emerged. Nonetheless, the existence of the Phillips curve has been observed across many countries, such as in North Cyprus (Shahbaz et al., 2012). The behavioral aspects of the Phillips curve have also been examined, notably by Conrad (2023).

There is a large number of papers that try to simulate wage-price spirals with mathematical models (Flaschel, Kauermann & Semmler (2007), Mokoka (2017), Franta & Vlcek, 2024, Lucas (2021), Flaschel & Krolzig, 2003). For instance, Chen & Flaschel (2005) developed a model to analyze the behavior of wages and prices in different inflation scenarios. It discovered that there are "floors" for wage and price inflation, indicating they have a certain rigidity and do not easily decrease, particularly during low inflation. While this rigidity may help stabilize the economy in low-inflation periods, it can also lead to prolonged stagnation. Understanding these dynamics is crucial as they may prevent negative cycles where heavily indebted companies confront falling prices, potentially resulting in economic crises. However, deterministic mathematical models assume rational behavior, but he actors in the wage-spiral are humans. Do workers and firms interact dynamically setting prices and wages? Is there a wage-price or price-wage spiral? This should be tested by behavioral economics.

Behavioral modeling aims to create a framework that captures the underlying economic dynamics not assuming rational behavior (De Grauwe, P/Ji, Y., 2019; Conrad, 2019). While it does not claim to perfectly replicate reality, our approach diverges from traditional economic modeling by relying on experimental methods to better reflect human behavior. The advantage is that interactions between economic actors can be analyzed dynamically. By isolating key factors influencing decision-making and examining social interactions among multiple actors, these behavioral models allow for the formulation and testing of hypotheses using human subjects. Our experimental design is meticulously explained to enable replication by other researchers. Consistent with Popper's (1958) philosophical perspective, these hypotheses remain valid until they are disproven by experimental results that contradict them. The behavioral patterns identified through this process can serve as a foundation for the development of new theories and strategies in economic policy.

3. Experimental Design

Researchers see wages as the trigger and driver of inflation. The wages drive inflation and not the prices drive the wages and then inflation follows, i.e. they assume a wage-price spiral. Therefore, we formulate the test hypothesis:

"Wages trigger inflation and drive prices up further and not the prices by the wage adaption."

Two experiments were conducted to test this hypothesis: In game A, prices were increased first and in game B, wages were increased first. Experiments A and B were conducted during the winter semesters of 2023/24, 2024/25 and 2025/26, and the summer semesters of 2025, using MS Teams and Excel. The study included 154 participants (experiment A) und 103 participants (experiment B) divided into ten (A) and seven groups (B), comprising students from various Business Bachelor programs, such as macroeconomics and political economy, at the University of Applied Sciences HTW in Saarbrücken, Germany. The sequence of the experiments A and B has been changed.

The participants were divided into two groups: entrepreneurs and workers. The companies had to maximize their profits with a fixed production capacity of 500,000 units, while the workers aimed to earn the highest possible wages with a fixed 2,000 working hours per round. Both games had ten rounds. The companies set their prices. Then, the average price across all submitted prices was calculated, and companies whose prices were below the average could sell 100% of their output, while those with prices above the average could only sell 90%. Prices could be increased by a maximum of 10% per round. The capacity remained constant at 500,000 units throughout the game. There were no investments. The companies started with a price of 20 euros, which they had to input along with their initial equity of 10 million euros in the first round. Price increases by the companies determined the inflation rate, which retroactively reduced workers' wages.

The wages were set by the second group, the labor suppliers (workers), representing the only production cost. We started with a wage of 15 euros. Each round, students entered their wage offers for the upcoming year (round). Workers whose wage offers were above the average wage offer could sell 90% of their 2,000 hours at their offered wage, while those with wages below the average could sell 100% of their hours at their wage offer. Wages could also be increased by a maximum of 10% per round. For the companies, the average wage was calculated each round by subtracting the total wage costs (wage offer times hours worked) from the revenue (price times capacity of 500,000 units), resulting in profit. The profit was added to the equity. At the end, the company with the highest equity (based on accumulated profits) or the workers with the highest total wages earned would receive 10 euros in real money. The experiment was conducted with business administration students who possessed basic business knowledge. Business administration students will be managers in the business world in the future and will also work as employee. The most successful maximization of profits through price setting or income through wage setting was rewarded with €10 in variable remuneration. So, salience was given, as the reward corresponded to a clear output function. Furthermore, the reward increments were much more important than components of the students' utility (dominance).

4. Results

Game A: Price Increases

The graphs below represent the aggregated decision parameters of the students or their effects via the formulas shown. If there is no significant synchronization or uniform behavior among the students, the deviations cancel each other out and there is no change in the graphs. Groups and test subjects reacted in the same way. The standard deviations between the groups were supplemented for the game results, which are not distorted by the different group sizes.

In Game A, there was a tendency towards price increases, as both firms and employees sensed little resistance to their price and wage hikes. This corresponded to a low level of competition amid a surplus of money. In the third round, prices were increased by 5%, and in rounds 4 and 5, by 10% each (Figure 1). Subsequently, employees significantly raised their wages starting from round 6, with disproportionate increases in wages during rounds 6 and 8. In response, firms then increased their prices from round 8 onward. This means that in the experiment, the pressure on prices or the acceleration of inflation was triggered not by wages but by external price increases. Therefore, it was a price-wage-price spiral rather than a wage-price-wage spiral. Figure 2 shows the effects of price and wage increases on unit profits. Between rounds 3 and 5, profits rose due to price hikes, which would likely lead to an economic upturn outside the model in real world with more employment driven by increased investments. Employees could not fully compensate for the loss of purchasing power caused by inflation through wage increases (see Figure 1 for the real wages). As a result, distributional effects to the detriment of employees persisted to some extent. Figure 2 shows the effects of price and wage increases on unit gains. From rounds 3 to 5, profits rose due to the price increases, which, through stimulated investments, would lead to an economic upswing outside the model in

real world with higher employment. Workers were unable to fully offset the loss of purchasing power caused by inflation through wage increases (see Figure 1 for the real wages). The distribution effects that disadvantaged workers thus persisted in part.

Figure 1. Development of prices, wages and real wages in percent

Figure 2. Development of average unit gains

Table 1. Standard Deviations Game A

Round	1	2	3	4	5	6	7	8	9	10
Standard Deviation in €, prices	0	0,29	0,72	0,82	1,15	1,27	2,04	2,84	3,83	4,67
Standard Deviation of average unit gains in €	0	0,29	0,75	1,06	1,54	1,74	2,42	3,14	4,04	4,72
Standard Deviation in €, wages/real wages	0	0,24	0,47	0,77	0,99	1,31	1,64	2,03	2,47	2,87

Game B: Wage Increases

In Game B, wages were increased in a mirror image: in round 3 by 5%, and then again in rounds 4 and 5 by 10% each (Figure 3). These were the same increases as previously in experiment A on the price side, but now on the wage side. Here, the price pressure originates from the wage side. Initially, unit gains (Figure 4) were reduced, but the companies then raised prices in round 6 (Figure 3) to compensate for this. This represented a wage-driven inflation.

The effects on profit were contrary to those of the price-wage-price spiral. Unit gains (Figure 4) decreased, leading to less investment and resulting in a recession with unemployment. The development favored workers as long as companies could pass the higher wage costs onto customers through increased prices (Figure 3). In this way, companies were able to offset the initial decline in unit profits with price increases.

Thus, both scenarios are possible: a price-driven wage increase that further raises prices, and a wage increase that leads to inflation.

Figure 3. Development of prices, wages and real wages in percent

Figure 4. Development of average unit gains

Table 2. Standard Deviation Game B

Round	1	2	3	4	5	6	7	8	9	10
Standard Deviation in €, prices	0	0,35	0,47	0,78	1,07	1,45	1,76	2,13	2,39	3,14
Standard Deviation of average unit gains in €	0	0,24	0,72	0,96	0,82	1,23	1,55	2,01	2,43	3,20
Standard Deviation in €, wages/ real wages	0	0,23	0,51	0,81	0,72	0,59	0,90	1,13	1,24	1,35

5. Conclusion

The hypothesis "Wages trigger inflation and drive prices up further, and not the prices caused by wage adaptation" was falsified. Inflation was not driven unilaterally by wage increases. Both scenarios are therefore possible: a price-driven wage increase that further raises prices, and a wage increase that leads to inflation. Since the price increase, through inflation, reduces the real purchasing power of wages, workers have not been able to secure real wage. The result is distributional effects, manifesting as real income losses for employees in favor of businesses. This leads to increased demand for labor, which confirms the Phillips curve

However, this depends on whether companies can raise prices. If they cannot—due to competitive constraints or if the central bank does not increase the money supply—then this would lead to fewer profits and potentially bankruptcies. This, in turn, causes unemployment, and companies will also try to replace expensive labor with capital (more specifically, machines), which further increases unemployment. This would be more likely in a wage-price-wage spiral. Therefore, there is a distinction between a wage-price-wage spiral and a price-wage-price spiral because, in a price-wage-price spiral, companies' prices always increase, along with profits. This does not lead to bankruptcies and unemployment, whereas this is likely in a wage-price-wage spiral. Conversely, a price-wage-price spiral results in significant distribution effects to the detriment of workers.

Experiments have shown that there is always a reaction from the other side, regardless of whether the price or the wages were increased first. Responsibility therefore lies either with the trade unions or with the central banks, depending on whether the trade unions increased wages or the central banks increased the money supply and thus prices. The central bank plays a more significant role here because it can facilitate price and wage increases through increases in the money supply. It is also responsible for the wage increases that result from monetarily fueled price increases. Consequently, when the central bank assesses inflation, it must also consider the second-round effects that arise from wage adjustments to inflation, as well as the impacts on distribution. However, if workers are unable to adjust their wages due to poor economic conditions or low industrial competitiveness, social disruptions may occur. There will always be economic sectors where workers are not unionized and cannot secure wage increases to compensate for inflation. Empirical research on the effects of inflation caused by monetary policy is necessary to demonstrate the need for compensatory policy measures.

In principle, the central bank should adopt a more restrictive monetary policy in a price-wage-price spiral than in a wage-price-wage spiral to counteract distribution effects. Conversely, in a wage-price-wage spiral, a restrictive monetary policy can lead to unemployment and bankruptcies. Generally, however, an expansionary monetary policy supports both a price-wage-price spiral and a wage-price-wage spiral. Therefore, the central bank must carefully weigh the effects of its policies.

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