A composite index for workers' bargaining power and the missing-inflation matter

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PRELIMINARY DRAFT

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Abstract: This paper aims to construct a synthetic index of workers' bargaining power and investigate the relationship between it and inflation in the U.S. economy. As a first step, we identify the factors affecting the bargaining power of workers, referring to different groups of variables: labour market indicators; institutional indicators (e.g., collective bargaining coverage, union density); characteristics of the economy (e.g., degree of freedom for capital mobility; share of employment by sector). We then implement the principal component analysis (PCA) to assess the adequacy of the indicators and calculate the weights to aggregate the single indicators into a composite index. As a second step, we estimate the impact of our Bargaining Index on inflation by estimating an equation of the determinants of inflation. Finally, as a third step, we incorporate the composite index into the Phillips curve to assess the relevance of the "pro-workers condition" in wage and price inflation and its evolution over time. We refer specifically to the so-called "conflict-augmented" Phillips curve which integrates Phillips' original contribution with the views of classical economists on income distribution. The composite index thus has a twofold use: it sheds light on the extent to which changes in the labour market in recent decades have weakened workers' bargaining power, and it can be used to test how the evolution of the wage bargaining system affects inflation through the Phillips curve.

Keywords: Workers' bargaining power, synthetic index, principal component analysis, wage share, conflict inflation theory, Phillips curve

JEL classification:

1. INTRODUCTION

After the Great Recession and before the recent upswing in prices, the concept of hysteresis (Blanchard and Summers, 1986) has been rediscovered and used to explain the persistence of a high level of unemployment associated with a stable inflation rate (Blanchard et al, 2015). However, this has not represented a theoretical rethinking of the neoclassical explanation of the functioning of the labour market (Summa and Braga, 2020) but has consisted of a series of exceptions introduced in order to explain the phenomenon of missing deflation in the presence of an increase in the unemployment rate. On the one hand, the long-run effects of aggregate demand have been limited to productivity growth, population participation rates and the skill and expertise of workers, dismissing the adjustment of productive capacity to changes in the aggregate demand as implied by the tendency of firms to achieve a normal degree of capacity utilisation. On the other hand, inflation has still been viewed as stemming mainly from demand excesses in the labour market, and its lower sensitivity to unemployment in the last decade has been explained by several sources of imperfections such as insider-outsider wage setting or an increase in long-term unemployment (Paternesi Meloni et al, 2022;

Romaniello, 2022). This is not the case in a conflict theory of inflation combined with a demand-led growth perspective. In this theory, periods of high involuntary unemployment can be a normal situation and the root of inflation is mainly traced in conflicting claims over the income distribution of the parties involved in wage bargaining. Therefore, a non-vertical long-run Phillips curve may exist. Moreover, different inflation rates can correspond to the same unemployment rate according to the social and political factors affecting the bargaining power of the 'competing parties'.

The aim of this paper is to construct a synthetic index of workers' bargaining power starting from the experience of the United States and use it to shed light on how the changes in the US labour market that have occurred over the last decades have affected the bargaining position of workers. As a first step, we will clarify (Section 2) the main elements of the literature on conflict inflation and the determinants of workers' bargaining power, identifying them in the United States over the last decades. Specifically, we will refer to different groups of variables: labour market indicators; institutional indicators (e.g., collective bargaining coverage, union density); characteristics of the economy (e.g., degree of freedom for capital mobility; share of employment by sector). After a brief exposition of the methodology adopted to construct a synthetic index, we will then move on (Section 3) to aggregate individual indicators into synthetic components making use of the principal component analysis (PCA). In this respect, we will also compare different possible synthetic indexes. As a second step, we estimate (Section 4) the impact of our Bargaining Index on inflation by estimating an equation of the determinants of inflation. Finally, always in Section 4, we incorporate these indexes into the Phillips curve estimation to assess the relevance of the "pro-workers condition" in wage and price inflation and its evolution over time. We refer specifically to the so-called "conflict-augmented" Phillips curve, which integrates Phillips' original contribution with the views of classical economists on income distribution. The composite index thus has a twofold use: it sheds light on the extent to which changes in the labour market in recent decades have weakened workers' bargaining power and it is used to test how the evolution of the wage bargaining system affects inflation through the Phillips curve.

2. WORKERS' BARGAINING POWER AND THE CONFLICT-AUGMENTED PHILLIPS CURVE

The bargaining power of workers is a multidimensional and complex concept. Broadly speaking, the relative strength of the parties involved in wage bargaining is affected by past as well as current social and economic circumstances (cfr. Levrero, 2012 and 2013; Stirati, 1999). The past situation is consolidated into social norms, habits of the workers, minimum wages, and generally accepted rules of bargaining that affect the floor represented by the subsistence wage from which wage bargaining

will start and below which, under normal conditions, real wages will not fall, or will fall only temporarily. The current circumstances are those listed for example by Smith (1776) and Marx (1867) when positing, for a given technique, a positive relationship between the pace of capital accumulation and the wage rate. Thus, according to Smith, the wage rate will rise above the subsistence level when the amount of labour unemployment and underemployment falls due to capital accumulation (the increase in the average demand for labour) overtaking the increase in the working-age population (the increase in the supply of labour). Like Smith and Marx, in this second set of circumstances we can also include those social and institutional factors such as the social and political situation of a country, or the degree of organization of the workers, which are partly independent of the amount and rate of unemployment and thus represent truly autonomous elements determining the bargaining position of the workers. For instance, the workers' current degree of organization will be influenced by, in addition to unemployment, changes in labour legislation, the degree of class consciousness, the greater or lower cohesion among the different groups of workers, the degree of concentration of the labour force and its greater or lower substitutability in the labour process. Finally, in open economies, the threat of de-localization of production, the impact on employment of increasing international competition and the constraints imposed upon expansionary macroeconomic policies by free capital movements, are all phenomena that can directly or indirectly affect the strength of workers in wage bargaining (see Epstein&Burke, 2001; Pivetti, 2013; Rodrick, 1997; Wood, 1994).

A reference to this strength is usual in economic theory both when considering the determination of income distribution and when explaining the course of prices and money wages. As regards income distribution, in the classical approach of Smith, Ricardo and Marx, through the bargaining process, the wages in real terms will eventually have to reflect the relative strength of the workers in wage bargaining. Thus Buchanan (1817, p. 53) wrote in response to Malthus that "the (l)abourer (...) when he found his increased wages attended with no real improvement of his condition, would demand a second rise on the same principle which enabled him to obtain the first; and thus the money price of labour would continue rising until stopped by a real rise of wages". Always in the classical or surplus approach, an influence of the wage bargaining process on real wages is also recognized when following the idea advanced by Sraffa (1960, §44) that the real mark-up on prices can be fixed by the monetary authorities given the normal profits of enterprises. This does not in fact imply that wage bargaining has no power to change real wages, since "the policy of the monetary authorities is not conducted in a vacuum and the movement of prices and the money wages determined in the wage bargain will be amongst the most important considerations in the formulation of that policy" (Garegnani, 1979: 81. See also Pivetti, 1991).

However, a reference to the bargaining strength of workers is also traceable in other streams of thought, especially when explaining the actual course of distribution. Automation and just-in-time production processes, with the related phenomena of reduction of firm size and outsourcing, as well as ICT capital goods and related increasing rates of capital obsolescence, are thus said to have weakened the bargaining position of workers (cf. for instance Bental&Demougin, 2010; and Hornstein, Krussel&- Violante, 2002). Moreover, in a very Classical-Marxian vein, it is argued that capital «select[ed] and develop[ed] technologies that [were] much less labour intensive», as a reaction of the wage-push of the 1960s and the labour protection laws of the seventies (see for example Caballero&Hammour, 1997, p. 4). Finally, and perhaps more significant, in several models — especially those of the so-called New Keynesian school founded on a mixture of the principles of factor substitutability and optimization on the one hand, and "frictions" operating in labour and commodity markets on the other — "shifts" in the relation between the relative prices of the factors of production and the capital-labour ratio are ascribed, on empirical grounds, not to technological factors, but to an increase in the profit margins on prime production costs caused by a rise in the money rates of interest at the end of the 1970s (see for example Bagli, Cette&Sylvain, 2003; Landmann&Jerger, 1993), or by a reduction in the trade unions' bargaining power. The change in dismissal laws and rules of collective bargaining, unfavourable to workers, and the fall in union power, are in fact said to have influenced, together with an increase in monopsony power in the labour market (OECD, 2020), the trend of the share accruing to wages — reducing the amount of the "monopoly rents" the workers allegedly managed to "appropriate" (see, for example, Bentolilla&St.Paul, 2003; Blanchard, 1997, p. 103; Giammarioli and others, 2003).[1]

Moving on to the course of prices and money wages, and irrespective of the forces shaping the *real* mark-up on prices, the workers' bargaining power is crucial in the theory of cost inflation typical

[1] Of course, these factors affecting "monopoly rents" are introduced in these models to explain the changes in distribution together with those in the average rate of unemployment, based on the assumption that the "equilibrium" unemployment rate and the real wages vary in the same direction due to the principle of factor substitutability. Especially in this respect these models fail to account for the empirical facts, because the fall in the wage share explained in the models by "labour market deregulation" and a lower union power, occurred precisely when there was a rise, and not a fall, in the average rate of unemployment. It is still significant, however, that these factors are seen in these models to be as crucial to explaining the shift in distribution in the last thirty years as they are to an interpretation along Classical-Marxian lines. The difference is that in the Classical theory factors such as institutional changes are not seen to affect only "monopoly rents" since they are not seen as "disturbances" to underlying supply and demand forces. More importantly, the classical theory can easily account for the rise in unemployment and fall in wages (relative to productivity) because the unemployment rate and the wage rate are not viewed as related in a direct and functional way. On the contrary, unemployment is seen to be determined by technical progress and the pace of effective demand, which in turn is possibly negatively influenced by a fall in the real wages. Also technical innovation and globalization — the factors usually recalled as the main causes of the changes in functional income distribution by official publications of the International Monetary Fund (see IMF, 2007) and the European Commission (see EC, 2007) — are not mechanically linked to wages in the Classical theory. They are seen as having an influence on wages to the extent to which they affect the strength of labour in wage bargaining, through their effects on the amount of unemployment, and the cohesiveness and degree of organization of the workers.

of the post-Keynesian approach in which the root of price inflation resides mainly in conflicting claims over income distribution whose results may be different in different situations and be affected by the dynamic of "exogenous" nominal variables such as the exchange rate (Amico and Fiorito, 2013) and the interest rate (Stirati, 2001; Levrero, 2022). Two elements in this approach are relevant to the unemployment-inflation nexus and in line with the original contribution of Phillips (1958) before the introduction by Friedman (1968) of the notion of a non-accelerating unemployment rate. First, it entails that periods of high involuntary unemployment (or, in Marxian terms, the presence of a large industrial reserve army) can be a normal situation in market economies, especially in the absence of an appropriate aggregate demand stimulus (Garegnani 1990, Stockhammer, 2008). Second, according to this approach, the level and evolution of wages are determined by political, historical and institutional factors that could also change the relationship between unemployment and the wage rate because unemployment is just one, but not the only, source of the strength of workers in wage bargaining. Therefore, a central role in determining the outcomes of wage bargaining is attributed to the social and institutional context, understood also in a broad and political sense (Kalecki, 1943). This means that wage inflation can occur well before the situation of full employment and that a lower level of unemployment can be associated with a weak inflation dynamic due to the effects of other factors. In other words, an increasing inflation path can occur even if the economy is still quite far away from a situation of labour scarcity and the relationship between unemployment and the rate of change of money wages can vary over time due to the influence of political-institutional factors.[2] So, under the action of these factors, the slope of the Phillips curve can change and a different wage and price dynamic can be observed in relation to a certain average rate of unemployment. Therefore, in the following we first try to synthesize in a single index the elements that influence wage bargaining, including the above-mentioned political-institutional factors, in order to extrapolate the overall effect of workers' bargaining strength on wage and price dynamics. Thereafter, we fit the composite index into the estimate of the Phillips curve, which allows us to distinguish the role of unemployment from that of other social-institutional factors in affecting inflation.

A simple way to rationalize the conflict theory of inflation is, indeed, by means of a conflict-augmented Phillips curve obtained by listing the rate of unemployment as one of the elements

[2] For an admission also at the Central Bank level of the relevance of the erosion of worker bargaining power in explaining the flattened Phillips curve in the last decade, see Ratner and Sim(2022). The interest in the relationship between labour market conditions and inflation is compelling in the debate that has developed following the fiscal stimulus programme implemented by the Biden administration to cope with the pandemic crisis (Blanchard, 2021; Summers, 2021; Roubini, 2021), as well as nowadays with the upswing in the prices of intermediate and energy goods. However, this debate has been developed in the mainstream framework that interprets the price dynamic in the light of the unemployment gap (or output gap) and from this comes the feared risk of hyperinflation. We believe that our approach could provide interesting and more general answers to this concern.

influencing workers' claims in wage bargaining and introducing the possibility of an aspiration gap between the real wage targeted by workers in wage bargaining and the actual wage rate as determined by firms defending their real mark-up on prices in the presence of continuous increases in money wages (Hein and Schoder, 2011; Levrero, 2022; Rochon and Setterfield, 2012; Rowthorn, 1977; Stockhammer, 2008).

Let us indicate with

$$\hat{w} = \beta(\hat{p}^e + \gamma) \qquad [1]$$

the rate of change of nominal wages, where $\hat{p}^e$ is the expected inflation rate, γ the workers' desired increase in real wage and β the ability of workers to translate, in the bargaining process of nominal wage, their prices expectations and real wage aspirations. Let us also assume that the bargaining position of workers (γ) and their ability to obtain their real wage aspiration is negatively influenced by the unemployment rate (u), so that

$$\gamma = \gamma_o - \varphi u \qquad [2]$$

where γ_o represents the so-called autonomous claim (Isaac, 1991) and φ is the influence of the unemployment rate on the workers' bargaining position, and both (φ and γ_o) are interpreted as influenced by the institutional, political, and historical situation (see, for example, Stirati, 1994, 2001; Levrero, 2013 and 2022). Finally, for the sake of simplicity, let us assume that price inflation ($\hat{p}$) is equal to the increase in nominal wage ($\hat{w}$) minus the productivity growth ($\hat{\pi}$)[3] and that inflation expectations are fulfilled. By substitution we obtain

$$\hat{p} = \frac{1}{1-\beta}(\beta\gamma_o - \hat{\pi}) - \frac{\beta}{1-\beta}\varphi u \qquad [3]$$

From an empirical point of view, in order to test the overall effect on inflation of both the institutional and economic conditions affecting the relative strength of workers, we first estimate the following equation:

$$\hat{p} = \alpha_0 + \alpha_1 BI + \alpha_2 \hat{\pi} + \sum_i \alpha_i x_i \qquad [4]$$

where BI represents our composite index of workers' bargaining power[4] and x_i represents a vector of several covariates that could be relevant in determining the dynamic of nominal variables, as the terms of trade. Secondly, to account for the role of unemployment and differentiate it from other

[3] The analysis can be easily extended to consider the effect of changes in the profit margins and the prices of imported goods expressed in the domestic currency.

[4] It is widespread in economic analysis to obtain a broader definition of labour market slack (Pacitti, 2020; Cauvel and Pacitti 2021). However, our index means to be more general since it refers not only to labour market indicators, but also to institutions and economic structure.

elements, we unbundle the unemployment rate from our index and obtain a new indicator that considers all economic-institutional elements except unemployment that influence the strength of workers. In other terms, if our composite index BI can be interpreted as a measure of the bargaining position of workers (γ), then we obtain a measure of the so-called autonomous claim (γ_o) separated from the influence of the unemployment rate on the workers' bargaining position (φ). We thus estimate a conflict-claim augmented Phillips curve where the effect of the autonomous claim ($\frac{\beta}{1-\beta}$) can be represented by the coefficient α_1 of the modified synthetic index and the effect of the unemployment rate ($\frac{\beta*\varphi}{1-\beta}$) is captured by α_2:

$$\hat{p} = \alpha_0 + \alpha_1 BI^* + \alpha_2 u + \alpha_3 \hat{\pi} + \sum_i \alpha_i x_i \quad [5]$$

In the following sections we will identify the factors affecting the bargaining power of workers in the specific historical case of the United States. In general, these factors include labour market conditions as measured by unemployment, employment and participation rates, the duration of unemployment and distribution of workers by contract type (part-time, involuntary part-time and/or open-ended vs fixed-term contracts) and the extension of segmentation (namely, the role of gender and ethnicity in the relationship between workers). Moreover, they include the institutional characteristics of the labour market (for example, the coverage of collective bargaining, the rate of membership of workers in trade unions, the bounty of unemployment benefits and the minimum wage level), as well as factors related to the structure of the economy (such as its social structure, the degree of freedom for capital mobility, the average dimension of firms and the share of employment by sector). We will test the weight and relationship between these factors in the United States and their changes over time and construct a synthetic index of the workers' bargaining power. Having constructed this index, it will be inserted in the estimation of the Phillips curve to evaluate the relevance of "pro-workers conditions" in wage and price inflation and its evolution over time.

In order to test the robustness of our index, we will compare its changes with those in the adjusted wage share in the United States over the last decades, as suggested by several strands of literature. We will concentrate upon the 'relative or real wages', that is the relative share of the total product which the workers receives, because we consider it is the right way to evaluate the social position of the workers (see Marx, 1862–3, II, pp. 404 and 419).[5] The index must be able to explain the major historical change in income distribution and inequality over the last thirty years which put an end of

[5] The robustness of the synthetic index could also be tested by comparing its changes and those in money wages but this has similarities with the estimates of the augmented-conflict Phillips Curve. Moreover, for the same level of workers' bargaining power you may have different rates of change in money wages insofar as the real wage targeted by the workers remains different from the actual one.

the distributive compromise between capital and labour and creeping inflation in the years 1950-1968 (Amstrong, Glyn&Harrison, 1991; Marglin&Schor, 1994).[6]

That a significant change occurred after 1977-79 in the labour market institutional setting with respect to what was in place during the so-called "Golden age" of capitalism can be easily grasped by examining the following facts (Levrero 2012):

a) a constant or even declining real wage rate like the one we observe for ten years or more in the period 1977-2007 in some of the advanced capitalist countries is unusual even when looking at the historical wage trends in these countries since the 1850s, except for the period 1895-1913 in France and the United Kingdom, and the experience of the fascist regimes in Italy and Germany;

b) this is even truer when considering that the slowdown in the real wage growth rates since the end of 1970s was not accompanied by an analogous change in the trend of labour productivity: although lower (in most countries) than in the years 1950-1970, productivity growth rates were in fact usually greater than those of real wages;

c) while the correlation between actual real earnings and productivity became lower than in the years 1950-1970 (see for example Becker&Gordon (2009) for the United States), the correlation between real earnings and the unemployment rate rose (often displaying what we might call a real Phillips wage curve). Moreover, greater sensitivity of both money and real wages to cyclical variations in output, and of real wages to price changes, emerged;

d) looking at the trend in the adjusted wage share of the total economy, since the years 1980-85 a falling trend in the wage share has occurred in advanced capitalist countries (Bental&Demougin, 2010; EC, 2007; Ellis&Smith, 2007; IMF, 2007; Stockhammer, 2009)[7] which in some cases, reached values lower than those in the 1960s. In the United States, for instance, the adjusted wage share in

[6] In the period 1950-1977, except in the United States (where the wage rate growth was more similar to its secular trend), the real wage annual percentage increase was greater than in any previous historical phase after the first industrial revolution (see for instance Hansen, 1925; Phelps Brown, 1968 and 1973; Scholliers, 1989) — and, a fortiori, greater than in any previous historical period. The situation changed starting in the years 1977-1979, irrespective of the wage rate considered (contractual wages, earnings, or labour compensation), and irrespective of the deflator used (the cost of living index, or the GDP price deflator). For instance, since 1977-79 the growth rate of real earnings in terms of the cost living index has fallen, and in some phases and countries approached zero (in Italy in 1990s), or even became negative (in the United States in the years 1977-1997). However, the constancy or even fall of the real wages in some countries and phases in the period 1980-2010 is less apparent in terms of the GDP price deflator, due to the increase in the cost-of-living price index with respect to the GDP price (see, for example, Bosworth, Perry&Shapiro, 1994). Moreover, in the United States, real earnings grew less than labour compensation, since in some years fringe benefits and other social contributions rose and real earnings referred only to production and not to supervisory workers, whose compensation grew considerably.

[7] The fall is particularly strong in the Euro area when compared with the United States and the United Kingdom: stopping the data before the last output downturns determined by the financial crisis of 2007 and by the pandemic crisis, the adjusted wage share passed in the eurozone from 72.5 in 1982 to 63.3 in 2007 (cf. Stockhammer, 2009). However, also in the former countries, the fall is strong when considering the wage share net of the wages of the managers.

the 2000s returned to the value of the 1950s, when (cf. Kravis, 1962) it was around 65 per cent. In France, in 1998, it had the same value as in 1925 (cf. Piketty, 2003);

e) the falling wage share trend does not seem to reflect changes in the composition of value added towards sectors characterized by a lower wage share, but a true change in distribution. The same effect of privatizations and thus the tendency to reduce the weight of the public sector, while it may to some extent explain that fall (since in the public sector the value added is equal to the wage bill) can by itself be seen as an aspect of the change in the institutional setting of the advanced market economies that occurred in these years — and that brought to an end that positive contribution of the public sector towards a secular increase of the total economy wage share that had usually been acknowledged in the previous periods (see Budd, 1911; Kravis, 1962; Phelps Brown&Hart, 1952);

f) in the Anglo-Saxon countries in particular, the benefits of economic growth have been concentrated at the top end of personal income distribution, whose share in personal income in the United States actually returned to the 1922-1945 values. Thus, while in the US, until 1973, the average real household income increased in any quintile, but more in the lower ones, since 1973 its growth rate has fallen, but the higher quintile have had the greater rate of growth. As outlined by Becker and Gordon (2009, p. 105) «(o)f the total increase in real labor income of over $2.8 billion, less than 12 per cent went to the bottom half of the income distribution. More of the income change accrued to the top 1 percent than to the entire bottom 20 percent»;[8]

g) together with this change in personal income distribution, an increasing segmentation of the labour market occurred, with an increase in wage differentials among sectors and between skilled and unskilled workers. Whereas the wage skill premium had usually fallen in advanced capitalist countries between 1870 to 1970 (especially in the years 1915-1950), starting in 1980 it began to rise, also due to the weakening of the trade unions and of labour solidarity. Moreover, also an increasing "wage drift" can be observable, once again as a result of the weakening of the trade unions.

Several factors affecting the bargaining power of workers have helped to determine the above-mentioned phenomena. While in European countries, the labour market has undergone an enormous, widespread process of deregulation, in the US, the bargaining power of workers has diminished without an analogous process of deregulation. Elements such as the depressed role of trade unions

[8] Especially in the Anglo-Saxon countries, but in general in all the industrialised nations, a polarisation of society occurred, with the top income groups increasing their income share (see for instance Atkinson, 1997; Matthews, 2011; Piketty&Saez, 2003). In some countries, this was accompanied by real earnings actually falling (this is the case of the United States) or remaining constant over time, for the lower deciles of the distribution.

(Stansbury and Summers, 2020),[9] precariousness ("being partly unemployed") and the high duration of unemployment (Yellen, 2014; 2016) could have increased the "cost of job loss" (Pacitti, 2020) and impaired the ability of workers to achieve wage increments. Moreover, a relevant matter relies on the segmentation of the labour market both at gender and ethnical level (see, for example, Ferry and Mayoral, 2021). Put simply, the presence of a significant share of marginal workers has influenced the bargaining power of workers as a whole from several points of view that go from the low propensity of marginal workers to join the trade unions to the emergence of conflicts within the working class (Barba and Pivetti, 2016). Furthermore, recent literature has drawn attention to the role of involuntary part-time employment and the dynamics of vacancy rates (especially after the pandemic crisis). While scientific research has disproved the effectiveness of labour market deregulation in improving the employment performance of the labour market, its effect on wage dynamics is now recognized even among mainstream authors (Blanchflower and Poser, 2014; Linder et al., 2014; Yellen, 2014, 2016).

Other factors, however, have also contributed to weakening workers in wage bargaining both in the decade 1979-1989, which we can label “the Age of Restoration” (see also Serrano, 2004), and in “the Age of Capital”, which is now in crisis. Labour supply easily augmented at will by immigration and a process of “restructuring”, outsourcing, and industrial delocalisation of production in developing countries occurred. Until 1995, the pressure of increasing international competition was felt less due to the devaluation of the dollar after the Plaza Agreement in 1985 which set the American interest rates below those of the major European countries (see Frenkel, 2015) and favoured exports. However, the North American Free Trade Agreement (NAFTA) signed in 1993 helped to suppress real wages for production workers and reduced fringe benefits. Moreover, since the early 1990s, expanding global trade, propelled by China's spectacular growth, played a much larger role in the U.S. labor market (Autor and Hanson, 2014; Blair and Gurevich, 2021). Although modest relative to the decline in U.S. manufacturing employment of 5.2 million workers between 2001 and 2011, import competition reduced aggregate U.S. employment between 600,000 and 1.25 million jobs between 1991 and 2011. The effect was strong, especially on the wages of low-skilled workers, and was attenuated only thanks to expansionary fiscal policies that led to a sharp rise in overall employment with an expansion of non-trade and service sectors. This ensured an unemployment rate in the United

[9] As known, a different political climate regarding trade unions and the determination of firms to change the rules of production and wage bargaining they bear witness to occurred after 1979. The defeats in 1981 in the Fiat strike in Italy and in the air traffic controllers’ dispute in the US, as well as the miners’ strike in the UK in 1984-85 and the struggles of IG Metall in Germany in 1984, are all symptomatic of this attack.

States that was lower than those experienced in other advanced countries, unlike what occurred in the period 1950-1970 (cf. Maffeo, 2011).[10]

3. A SYNTHETIC INDEX OF WORKERS' BARGAINING POWER: THE METHODOLOGY

The construction of a composite indicator consists of numerous stages, any of which can be approached with different methodologies. The usual basic steps in the procedure (OECD, 2008) are: (1) defining the phenomenon to be measured (theoretical framework); (2) selecting a group of individual indicators; (3) normalizing the individual indicators; (4) aggregating the normalized indicators; and (5) validating the composite indicator.

To build our synthetic indicator for *workers' bargaining power*, our latent phenomenon, we refer to the so-called formative model where the individual variables used to define a phenomenon are causes of the latent variable, rather than its effect.[11] This means that if the phenomenon changes, the single indicator could not change (OECD, 2008). In order to select the individual indicators, we implement a Principal Component Analysis (PCA),[12] which allows us to reduce the number of variables (i.e., aggregating them in components) preserving the maximum proportion of the total variation. After standardizing the indicators, we use PCA to assess the adequacy of the indicators and, subsequently, to calculate weights that allow the different components to be aggregated into a single composite indicator. Finally, the obtained aggregate index has to be validated to understand if it can describe the object of the analysis.

3.1 The Principal Component Analysis

PCA is a multivariate statistical technique used to reduce the number of variables in a data set into a smaller number of components. In practice, starting from a set of correlated variables, PCA creates *uncorrelated components*, where each component is a linear weighted combination of the initial variables, and the weight is represented by the eigenvectors of the correlation matrix between variables.

[10] This is confirmed in our synthetic indexes by the effects of their different components on it since those concerning the labour market conditions often move in a different direction from the other components.
[11] In the case of the bargaining power of workers, we consider a formative rather than a reflective model to be more appropriate due to the multidimensional character of the workers' bargaining power and being tautological assuming that higher real wages means a higher strength of workers.
[12] As an extension of this work, we are also going to use a subjective or expert weighting approach.

The idea under PCA is to account for the highest possible variation in the indicator set using the smallest possible number of factors. The variance (σ) for each principal component is given by the eigenvalue of the corresponding eigenvector. The components are ordered in terms of the explained variance in the original dataset because PCA tries to put the maximum possible information in the first component, then the maximum remaining information in the second and so on. In this sense, under the constraint that the sum of the squared weights is equal to one, the first component (PC1) explains the largest possible amount of variation. The second component (PC2) is completely uncorrelated with the first component and explains additional but less variation than it. Since the sum of the eigenvalues equals the number of variables in the initial data set, the proportion of the total variation in the original data set accounted by each principal component is equal to $\sigma i/n$. The higher the degree of correlation among the original variables in the data, the fewer components are required to capture common information. First, we proceed to standardize the selected variables. The chosen standardization method consists in taking the difference between the actual value of the variable and its means, divided by the standard deviation. The result is that each individual indicator will have 0 mean and standard deviation equal to 1. When we suppose that the individual indicator has a negative polarity with respect to the latent phenomenon, we multiply its standardized value by -1 (OECD, 2008). Second, we test the adequacy of the data. To select which variables to include in the synthetic index, we implement three selection criteria:

1. variables with a correlation of more than 0.9 cannot be included in the same index
2. variables with KMO[13] of less than 0.4 has been dropped
3. variables with loading of less than 0.3 in each component have been dropped.

The threshold values of these parameters can be found in the literature; however, since some degree of discretionality exists in the choice of these criteria, we present three different indices, using different groups of variables.

Once the variables have been selected, we proceed with the identification of a certain number of latent components representing the data. Each component depends on a set of coefficients (loadings) that measure the correlation between the individual indicator and the latent component. Standard practice is to choose the component that: (i) has associated eigenvalues larger than one; (ii)

[13] The Kaiser-Meyer-Olkin (KMO) test measures sampling adequacy for each variable and for the complete sample of a Factor analysis. It compares the magnitudes of the observed correlation coefficients with the magnitudes of the partial correlation coefficients. The idea is that the partial correlations should not be very large if distinct variables are expected to emerge from factorization.

contributes individually to the explanation of overall variance by more than 10%; and (iii) contributes cumulatively to the explanation of the overall variance by more than 60%.

After this, we proceed with the varimax rotation[14] of factors in order to minimize the number of individual indicators that have a high loading on the same factor. The objective is to obtain a structure in which each variable is loaded exclusively on one of the selected components since they are more easily understood.

The last step in the PCA analysis consists of the construction of the weights used to aggregate the components. To weigh each rotated component, we use the share of the total variance explained by each component, i.e., we divide the eigenvalue of each rotated factor by the sum of the eigenvalue of all factors. Thus, the composite index is a weighted average of rotated principal components with weights calculated as follow:

$$w_i = \frac{eigenvalues_i}{\sum_i eigenvalue_i}$$

where w_i stands for the relative weight of the *i-th* principal component. This formula implies that the component that explains the highest share of total variance will have the highest relative weight.

3.2 Data and composite index construction

We implement our strategy on a set of variables for the USA from 1960 and 2018 and construct three alternative Bargaining Indexes (BI). Data come from the OECD/AIAS ICTWSS database, Bureau of Labor Statistics (BLS), the Federal Reserve Economic Dataset (FRED) of the Federal Reserve Bank of St. Louis, and the AMECO database. We can divide our set of variables into three main groups (Table 1). The first one consists of the variables related to trade union setting and worker conflict (variables from 1 to 7). The second group (8-13) consists of the variables related to the condition of the labour market, while the third one (16-17) contains the variables referred to trade openness and free capital movement. Moreover, we also consider the Replacement rate (15) which measures the generosity of the unemployment benefits and the share of employed in the manufacturing sector (14) that describe, in a certain sense, the structural organization of the economy.

[14] The Kaiser-Varimax rotation is a standard practice in PCA analysis that maximizes the sum of the of the squared loadings, where 'loadings' represents the correlations between components and variables.

Table 1 - List of variables

	Trade union and worker conflict
1	Total Union Membership (TUM)
2	Effective numbers of unions
3	Membership concentration at confederation level
4	Membership concentration at union level
5	Union Density
6	Workers in stoppage
7	Number of Stoppage
	Labour Market condition
8	Unemployment rate
9	Short-term unemployment rate
10	Incidence of long-term unemployment
11	Employment rate
12	Partecipation rate
13	Share of Involuntary part-time
14	Share of employed in Manufactoring
15	Replacement Rate
	Trade and Capital flow
16	Openess index
17	Share of outward FDI on GDP

From the original list of variables, we only take the indicators that meet the criteria listed above. We experimented with several combinations of variables but for the sake of brevity, we report only three of them in the text.[15] Table 2 shows the rotated components of the three BI index formulations. The first two indexes differ in the choice of variables that share a correlation greater than 0.9 (e.g., different labor market variables; union density and the share of manufacturing employment), and they do not consider the variables referred to trade openness and capital movement. However, these variables are considered in the BI 3.

[15] Results of other combinations can be provided by the authors upon request.

Table 2 Loading of rotated Principal Components for Index 1, Index 2 and Index 3

Variables	BI 1			BI 2			BI 3		
	Comp 1	Comp 2	Comp 3	Comp 1	Comp 2	Comp 3	Comp 1	Comp 2	Comp 3
Total Union Membership			0.721			0.7236	0.3491		
Effective numbers of unions	0.3812			0.3208				0.4383	
Membership concentration at confederation level	0.3075			0.3365			0.4859		
Membership concentration at union level	-0.358			-0.347			-0.395		
Union Density	0.4665								
Workers in stoppage	0.3918							0.5511	
Number of Stoppage				0.37					
Unemployment rate					0.6108				0.6105
Short-term unemployment rate		-0.626							
Incidence of long-term unemployment		0.3656			0.3595		0.3617		0.3222
Employment rate				-0.384				-0.635	
Partecipation rate	-0.468		0.4964						
Share of Involuntary part-time		0.661			0.6013				0.6531
Share of employed in Manufactoring				0.4264					
Replacement Rate				-0.387		0.3963			
Openess index							0.376		
Share of outward FDI on GDP							0.387		

Figure 1 reports the graph of the 3 indexes. Due to the length of the series for the outward FDI, BI 3 starts from 1971 instead of 1960. Even if the path of the bargaining power of workers shows a clearly decreasing trend, in its series different phases can be identified.

The first acceleration in the reduction of workers' bargaining power occurs in the period at the end of the '70s and the beginning of the '80s. Indeed, between 1978 and 1983 BI1 and BI 2 fell by about 37%; while BI3 falls by about 27%. However, while the first two indexes show a, albeit poor,

recovery, the third Index continues to fall until 1989. After a brief interruption in the decreasing trend, the first two years of the '90s signal a new period of a sharp reduction in the bargaining strength of workers followed by some years of stagnation between 1993 and 1999/2000. In the following period (2000-2003), the BI 1 and BI 2 decrease by about 45% while the fall in BI 3 is equal to 39% and lasts longer (from 1998 to 2005). Finally, the stronger period of erosion in the bargaining position of workers occurs in correspondence with the Great Recession. Indeed, 2010 represents the minimum value of all three Indexes and the workers will only recover the level of bargaining power of 2005 in 2018.

Figure 1 - The Bargaining indexes

The final step in our PCA analysis consists of the validation of the estimated indexes in order to explore the robustness of the choice of the inclusion and exclusion of individual indicators and the setting of different criteria to construct the composite indicator. As mentioned in Section 2, to assess whether our composite index describes the workers' bargaining power, we test the relationship between it and the labor share since we expect the factors affecting bargaining power to influence functional income distribution. The labour share represents the share of income that belongs to workers and measured as compensation per employee as percentage of GDP per person employed.[16]

[16] Source: AMECO database.

The graphical comparison, presented in Figure 2, confirms that all the Bargaining Indexes are related to the labour share. Indeed, over the whole period, they show a strong correlation (the correlation coefficients are 0.86% for BI 1; 0.87% for BI 2 and 0.90% for BI 3) with the labour share.[17]

Figure 2 Bargaining Indexes and the Labour share

4. THE RELEVANCE OF "PRO-WORKERS CONDITION" IN PRICE INFLATION: AN EMPIRICAL ESTIMATION

4.1 The base model

In order to assess the impact of our BI on price dynamics, estimates have been made using four different models. Model 1 is the simplest model we tested and includes the dependent variable, i.e., the inflation rate ($\hat{p}_t$), its lagged values and our synthetic index for the workers' bargaining power

[17] In addition to visual inspection and correlation, we also tested this with simple regression-based correlations, and we found a strong and statistically significant relationship between the Bargaining Index and the Labour share. In particular, the regression coefficient is equal to 0,67 for Index 1, 0.69 for Index 2 and 0.71 for Index 3. More importantly, we found this during both negative and positive phases of the bargaining position of workers.

(BI_t). Following the empirical literature, we included inflation lags among the regressors to account for the relevance of past inflation on the present one. We derive the autoregressive structure of our model looking at ACF and PACF of OLS residuals; Schwarz's Bayesian information criterion and the Akaike information criterion have also been used to choose the optimal number of lags. The impact of the growth of labour productivity ($\hat{\pi}_t$) is considered in Model 2. Moreover, we add step by step a set of control variables referring to the relative price of export goods in terms of import ones (Δtot_t) in Model 3 and the percentage change of the price of oil ($\hat{p}^{oil}{}_t$) in Model 4. Since we found influential outliers in the residuals, we also insert a set of year – dummy variables (α_t) which may vary in each model. Model 4 is therefore

$$1. \quad \hat{p}_t = \alpha + \beta_n \hat{p}_{t-n} + \gamma_1 BI_t + \gamma_2 \hat{\pi}_t + \gamma_3 \Delta tot_t + \gamma_3 \hat{p}^{oil}{}_t + \alpha_t + \varepsilon_t$$

where subscript "t" stands for time and the error term ε_t is assumed to be i.i.d. Thus, the inflation rate is expressed as a function of past inflation, the level of workers' bargaining power, the growth of productivity, the change in the terms of trade, and the growth of the price of oil. The complete list of variables is reported in Appendix 1.

Table 3 reports our preliminary results of the OLS estimations using the second formulation of our Bargaining Index.[18] The coefficient of our synthetic index of workers' bargaining power is significant and positive in all models. Thus, a positive effect of workers' bargaining strength on inflation is confirmed even when we consider all covariates. This means that our provisional results are robust to the specification of the model. In Model 4, the complete one, the coefficient of the index is equal to 0.15, i.e. a unit increase in workers' bargaining power is associated with an increase in the inflation rate of 0.15 percent. Moreover, as shown by their coefficient, the lagged value of the inflation rate seems to explain a significant proportion of the current inflation rate. When it is considered, the *growth of labour productivity* has a negative impact on the inflation rate by about 0.2 percent. The same occurs with the change in the *terms of trade* which has a significant coefficient both in Model 3 and in Model 4. Being the terms of trade defined as the ratio between export and import price, an increase in the change of terms of trade produces a reduction in the inflation rate by about 0.25 percent. On the contrary, a percentage increase in the *price of oil* determines an increase of 0.17 percent in the inflation rate.

[18] Estimates were also made with the first BI formulation, which we do not report in the text but are available upon request, and which confirm the results.

Table 3 - Estimation with Bargaining Index 2

VARIABLES	Model 1	Model 2	Model 3	Model 4
$\hat{p}_{t-1}$	0.655***	0.779***	0.713***	0.698***
	[0.0685]	[0.115]	[0.0620]	[0.0541]
$\hat{p}_{t-2}$		-0.298**		
		[0.103]		
BI_t	0.115*	0.358***	0.128*	0.147**
	[0.0435]	[0.0587]	[0.0588]	[0.0515]
$\hat{\pi}_t$		-0.261***	-0.206**	-0.229***
		[0.0619]	[0.0593]	[0.0523]
Δtot_t			-0.336***	-0.255**
			[0.0635]	[0.0766]
$\hat{p}^{oil}{}_t$				0.174**
				[0.0498]
d74	1.862***			-0.496
	[0.475]			[0.404]
d80	1.710**	1.045*		
	[0.499]	[0.461]		
d82			-0.815*	-0.860*
			[0.396]	[0.346]
d10		1.553**	0.746	0.656
		[0.457]	[0.377]	[0.329]
Constant	-0.0494	0.146*	0.0428	0.0700
	[0.0618]	[0.0664]	[0.0582]	[0.0512]
Observations	58	48	48	48
R-squared	0.803	0.871	0.911	0.936

Standard errors in brackets

*** p<0.001, ** p<0.01, * p<0.05

Notes: $\hat{p}_{t-1}$ *and* $\hat{p}_{t-2}$ *are the lagged value of inflation rate,* BI_t *is the level of Index 2 for workers' bargaining power,* $\hat{\pi}_t$ *is the percentage change of labour productivity,* Δtot_t*is the first different of terms of trade,* $\hat{p}^{oil}{}_t$*is the percentage change of the oil price, d74 d80 d82 d10 are the dummies for the years 1974, 1980, 1982 and 2010*

The previous results are confirmed in Table 4 which reports the estimates with the third formulation of the Bargaining Index. With respect to previous estimations, in Model 4 we consider 3 lags for the inflation rate according to the test for the optimal structure of lags. Also in this case, the coefficient of the Index for workers' bargaining power is positive and significant in all the specifications. In Model 4, a unit increase in the *BI* is associated with a percentage increase in the inflation rate of about 0.13 percent. As for the previous specification, the coefficient of *labour productivity* is negative and equal to -0.20 percent, as well as the coefficient of change in *terms of*

trade. Moreover, a percentage increase in the *oil price* is associated with a 0.17 percent increase in the inflation rate.

Table 4 - Estimation with Bargaining Index 3

VARIABLES	Model 1	Model 2	Model 3	Model 4
$\hat{p}_{t-1}$	0.764***	0.811***	0.718***	0.886***
	[0.134]	[0.119]	[0.0635]	[0.0780]
$\hat{p}_{t-2}$	-0.261*	-0.350**		-0.370**
	[0.127]	[0.109]		[0.112]
$\hat{p}_{t-3}$				0.190*
				[0.0704]
BI_t	0.216**	0.314***	0.0989*	0.129**
	[0.0645]	[0.0570]	[0.0419]	[0.0450]
$\hat{\pi}_t$		-0.278***	-0.206**	-0.204***
		[0.0653]	[0.0611]	[0.0493]
tot_t			-0.354***	-0.261***
			[0.0617]	[0.0687]
$\hat{p}^{oil}{}_t$				0.172***
				[0.0454]
d80	1.605**	1.061*		
	[0.525]	[0.483]		
d71				
d74	1.431**			-0.661
	[0.513]			[0.371]
d82			-0.842*	-0.508
			[0.402]	[0.349]
d10	1.010	1.582**	0.700	0.978**
	[0.528]	[0.481]	[0.379]	[0.324]
Constant	-0.0457	-0.00942	-0.0143	-0.00671
	[0.0703]	[0.0628]	[0.0506]	[0.0404]
Observations	48	48	48	48
R-squared	0.829	0.859	0.909	0.950

Standard errors in brackets

*** p<0.001, ** p<0.01, * p<0.05

Notes: $\hat{p}_{t-1}$ *and* $\hat{p}_{t-2}$, $\hat{p}_{t-3}$ *are the lagged value of inflation rate,* BI_t *is the level of Index 2 for workers' bargaining power,* $\hat{\pi}_t$ *is the percentage change of labour productivity,* Δtot_t*is the first different of terms of trade,* $\hat{p}^{oil}{}_t$ *is the percentage change of the oil price, d74 d80 d82 d10 are the dummies for the years 1974, 1980, 1982 and 2010*

4.2. An extension of the model

In order to be in line with the literature on the Phillips curve, we intend to estimate an inflation function that explicitly controls for unemployment. Therefore, we build an alternative synthetic index

for the workers' bargaining power which does not consider variables related to unemployment and labour market slack.

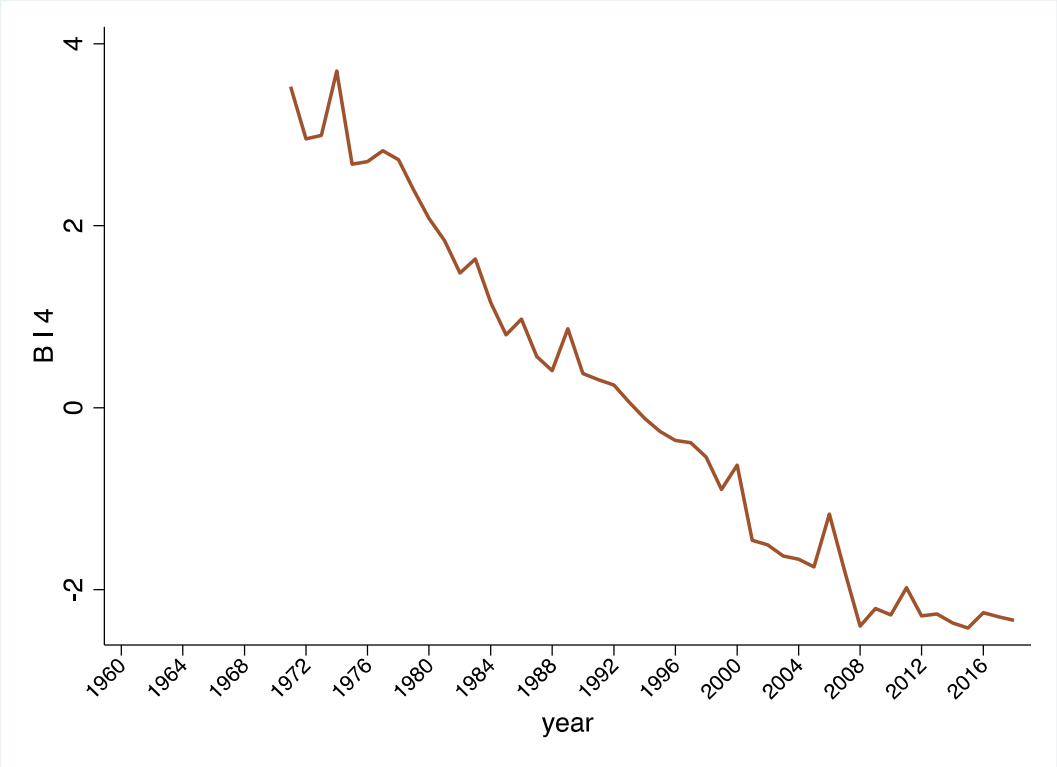
Table 5 shows the loadings of rotated components obtained following the PCA, as described in Section 3. The new modified Bargaining Index does not include variables referred to the unemployment but only institutional ones, concerning the trade union enrollment, diffusion and strike activities, the economic structure and the free movement of capital.

Table 5 - Loading of rotated Principal component

Variables	BI 4 (without unemployment)	
	Comp1	Comp2
Total Union Membership	0.396	
Effective numbers of unions		0.3294
Membership concentration at confederation level	0.4714	-0.3209
Membership concentration at union level	-0.4218	
Share of employed in Manufactoring	0.3716	
Partecipation rate		-0.6919
Number of Stoppage		0.4345
Days idle due to workers' strike		0.3108
Share of outward FDI on GDP	0.3816	

Figure 3 reports the path of our modified index. As we can see, this index shows a clear and continuous declining trend between the starting date (1968) and 2004. The second phase of sharp reduction occurs between 2007 and 2008, coinciding with the Great Recession while the subsequent years of recovery are characterized by stagnation.

Figure 3 Synthetic index for workers' bargaining power without unemployment



Using the new modified index, we replicate the previous model controlling explicitly for the unemployment rate (u_t). Equation 2 reports our version of the Phillips curve in which, to understand the inflation path, we consider both the social-institutional framework influencing workers barganining power and the labour market slack.

2. $$\hat{p}_t = \alpha + \beta_n \hat{p}_{t-n} + \gamma_1 BI_t + \gamma_2 u_t + \gamma_3 \hat{\pi}_t + \gamma_4 \widehat{tot}_t + \gamma_5 \hat{p}^{oil}{}_t + \alpha_t + \varepsilon_t$$

Table 6 reports the preliminary findings of our estimation. All the main results in Table 3 and Table 4 are confirmed since the coefficient of the *synthetic index* is always statistically significant and positive. Moreover, the *unemployment rate* shows a negative and significant impact on the inflation rate. In particular, in Model 4, a percentage reduction in the unemployment rate determines a reduction of 0,11 percent in the dependent variables, i.e. the inflation rate. Also in these specifications, the percentage change in *labour productivity* is negatively related to the inflation rate which means that an increase in productivity reduces the distributive pressure on price dynamics. The same occurs for the change in *terms of trade*, while the percentage change in the *price of oil* maintains a positive relationship with the inflation of the consumers' price index. However, this model is still in progress and better specifications are needed.

Table 6 Estimation with the modified Index

VARIABLES	Model 1	Model 2	Model 3	Model 4
$\hat{p}_{t-1}$	0.652***	0.645***	0.790***	0.739***
	[0.108]	[0.103]	[0.0751]	[0.0683]
BI_t	0.129*	0.187***	0.0574	0.0819*
	[0.0510]	[0.0469]	[0.0405]	[0.0366]
u_t	-0.230**	-0.270**	-0.149*	-0.110*
	[0.0834]	[0.0792]	[0.0646]	[0.0585]
$\hat{\pi}_t$		-0.256***	-0.195**	-0.216***
		[0.0652]	[0.0571]	[0.0515]
tot_t			-0.332***	-0.262**
			[0.0619]	[0.0762]
$\hat{p}^{oil}{}_t$				0.164**
				[0.0514]
d74	1.550**			-0.486
	[0.482]			[0.408]
d80	1.693**	1.222*		
	[0.499]	[0.487]		
d82			-0.691	-0.765*
			[0.393]	[0.351]
d10	1.061	1.482**	0.994*	0.775*
	[0.528]	[0.510]	[0.406]	[0.366]
Constant	-0.0346	0.00646	-0.00421	0.0145
	[0.0682]	[0.0641]	[0.0497]	[0.0447]
Observations	48	48	48	48
R-squared	0.839	0.854	0.916	0.937

Standard errors in brackets

*** p<0.001, ** p<0.01, * p<0.05

Notes: $\hat{p}_{t-1}$ *are the lagged value of inflation rate,* u_t *is the unemployment rate* BI_t *is the level of Index 2 for workers' bargaining power,* $\hat{\pi}_t$ *is the percentage change of labour productivity,* Δtot_t *is the first different of terms of trade,* $\hat{p}^{oil}{}_t$ *is the percentage change of the oil price, d74 d80 d82 d10 are the dummies for the years 1974, 1980, 1982 and 2010*

5. CONCLUSION

Although the bargaining power of workers is affected by social and institutional factors which cannot be easily synthesized by a quantitative index and acquire concreteness only for specific historical cases, our analysis shows the usefulness of a synthetic index of it to shed light on the factors shaping the course of prices and money wages. By considering a set of economic and institutional variables affecting the strength of workers in wage bargaining, our index confirms the relevance of the erosion of this strength in explaining the flattening in the Phillips curve in the last decade (see Ratner and

Sim, 2022). Moreover, our analysis widens the first results after Phillips (1958) where the rate of change in money wages were explained by some indicators of unionization and workers' militancy in addition to the unemployment rate (see for example, Eckstein and Wilson 1962; Hines, 1964; Mulvey and Trevithick, 1970; Pierson, 1968). Finally, our work confirms that an increase in labour productivity and an improvement in the terms of trade may help to reconcile the conflicting claims over income distribution of workers and capitalists, thus reducing the inflation rate. An extension of the work includes the use of a subjective or expert weighting approach, an analysis of different sub-periods for the case of the United States and the construction of a synthetic index of workers' bargaining power for other advanced countries.

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Appendix 1

Table A4 - List of variables

Variables	Description and sources	Time span
CENT	Centralization of bargaining system Source: OECD/AIAS ICTWSS database	1960-2018
Days Idle for strike	Days of idleness due to all stoppages in effect during the reference period Source: BLS-WSP	1960-2018
Effective number of unions	Effective number of unions. Source: OECD/AIAS ICTWSS database.	1960-2018
Employment rate	People employed (15+) on working age population Source: BLS-CPS	1960-2018
Incidence of long-term unemployment (STU incidence)	Incidence of long-term unemployment is the ratio between the long-term unemployed (persons, 27 weeks or more) and unemployed people. Source: BLS-CPS	1960-2018
Inflation rate (CPI index)	Annual percent change of CPI index. Source: OECD.Stat, Economic Outlook No 101, June '17.	1960-2018
Labour productivity growth	Annual percent change of gross domestic product per hours worked (in real terms). Source: OECD.Stat, GDP per capita and productivity levels.	1960-2018
Labour share	Adjusted wage share as percentage of GDP at current prices (Compensation per employee as percentage of GDP at market prices per person employed). Source: AMECO database	1960-2018
Membership concentration at confederation level	Membership concentration at confederation level Source: OECD/AIAS ICTWSS database	1960-2018
Membership concentration at union level	Membership concentration at union level Source: OECD/AIAS ICTWSS database	1960-2018
Number of stoppage	Number of work stoppages in the period Source: BLS-WSP	1960-2018
Oil price, percentage change	Annual percent change of the WTI crude index Source: FRED database	1960-2018
Openess index	The openness index is the sum of imports and exports over the GDP Source: FRED database	1960-2018
Participation rate	Active labour force as a percentage of working age population (15-64 years). Source: BLS-CPS	1960-2018

Replacement rate	Replacement rate in unemployment measures the level of unemployment benefits as proportion of the previous income Source: OECD database	1960-2018
Share of employed in Manufactoring	People employed in Manufactoring sector (NAICS 31-33) on total person employed Source: BLS-CES	1960-2018
Share of outward FDI on GDP	Outward FDI from US to resto of world on GDP Source: FRED database	1971-2018
Short-term unemployment rate	Short-term unemployment rate is the ratio between the number of short-term unemployed (persons, less than 27 weeks) and labour force (15-64 years). Source: BLS-WSP	1960-2018
Total union membership	Total union membership Source: OECD/AIAS ICTWSS database	1960-2018
Unemployment rate	Unemployed people as a percentage of active labour force Source: BLS-CPS	1960-2018
Union Density	Union density rate is the net union membership as a proportion of wage and salary earners in employment Source: OECD database	1960-2018
Workers in stoppage	Number of workers in stoppages in the period Source: BLS-WSP	1960-2018

Figure A3 - Bargaining Index 1: scores for rotated principal component

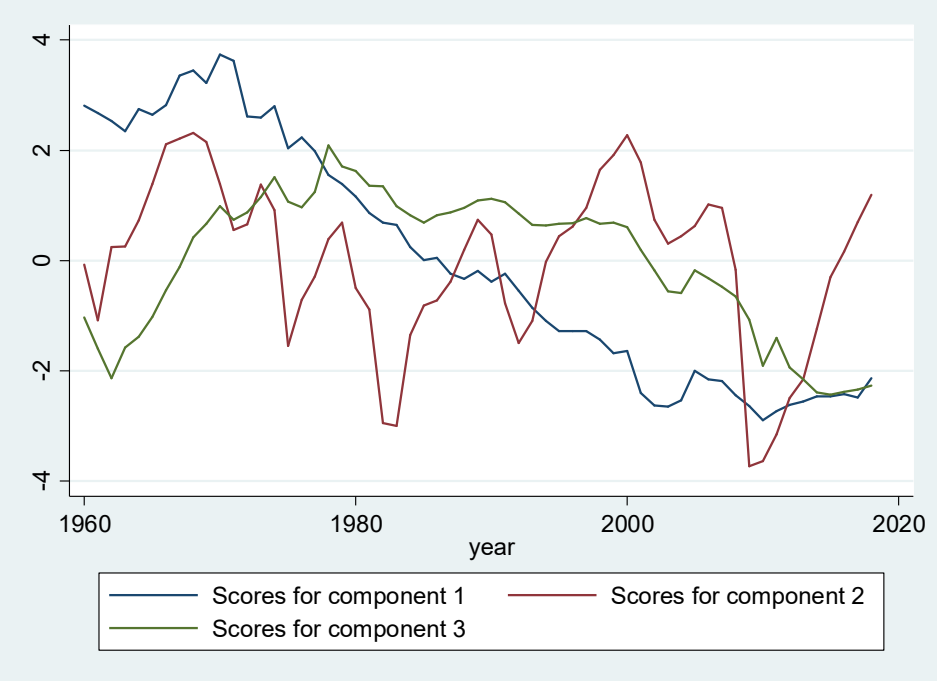


Figure A4 - Bargaining Index 2: scores for rotated principal component

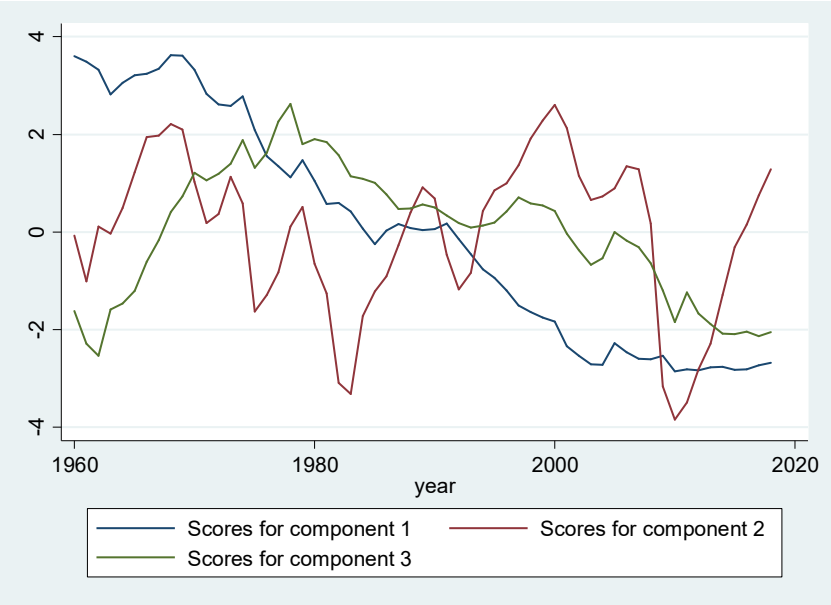
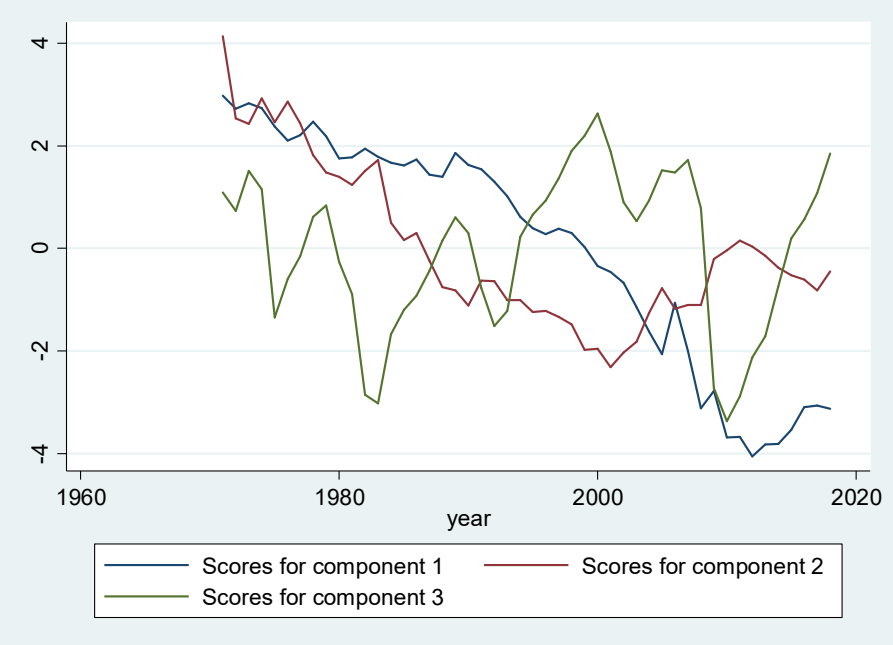


Figure A5 - Bargaining Index 2: scores for rotated principal component



Appendix 2

Table A5.1 - Estimation with Bargaining Index 1

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
$\hat{p}_{t-1}$	0.646***	0.784***	0.665***	0.700***
	[0.0692]	[0.114]	[0.0609]	[0.0558]
$\hat{p}_{t-2}$		-0.319**		
		[0.103]		
BI_t	0.121**	0.361***	0.110	0.136*
	[0.0446]	[0.0587]	[0.0581]	[0.0523]
$\hat{\pi}_t$		-0.261***	-0.128*	-0.225***
		[0.0617]	[0.0570]	[0.0532]
Δtot_t			-0.479***	-0.262**
			[0.0705]	[0.0778]
$\hat{p}^{oil}{}_t$				0.172**
				[0.0505]
d71			-0.723	
			[0.377]	
d74	1.855***		-0.804	-0.490
	[0.474]		[0.465]	[0.410]
d80	1.726**	1.050*		
	[0.498]	[0.460]		
d82				-0.849*
				[0.351]
d10		1.569**		0.629
		[0.456]		[0.333]
Constant	-0.0500	0.136*	0.0569	0.0600
	[0.0616]	[0.0655]	[0.0597]	[0.0511]
Observations	58	48	48	48
R-squared	0.804	0.872	0.909	0.934

Standard errors in brackets

*** p<0.001, ** p<0.01, * p<0.05