



The economics of the Phillips curve: Formation of inflation expectations versus incorporation of inflation expectations

Thomas Palley*

1913 S Street NW, Washington, DC 20009, United States

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ABSTRACT

This paper examines the theory of the Phillips curve, focusing on the distinction between “formation” of inflation expectations and “incorporation” of inflation expectations. Phillips curve theory has largely focused on the former. Explaining the Phillips curve by reference to expectation formation keeps Phillips curve theory in the policy orbit of natural rate thinking where there is no welfare justification for higher inflation even if there is a permanent inflation–unemployment trade-off. Explaining the Phillips curve by reference to incorporation of inflation expectations breaks that orbit and provides a welfare economics rationale for Keynesian activist policies that reduce unemployment at the cost of higher inflation.

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1. Introduction: the Phillips curve and macroeconomics

The Philips curve is a central component of macroeconomics, providing a structural equation that determines the rate of inflation as a function of the rate of unemployment. It is also central for policymaking since it constitutes a basic constraint on policy. If policymakers choose to stimulate economic activity, ultimate outcomes are constrained to lie on the Phillips curve which determines the set of sustainable inflation–unemployment outcomes. There is no lasting unemployment–inflation trade-off if the long-run Phillips curve is vertical.

This paper examines the theory of the Phillips curve theory, focusing on the critical distinction between “formation” of inflation expectations and “incorporation” of inflation expectations. Phillips curve theory has historically

focused on the former and neglected the latter. That has had profound and little appreciated implications for Phillips curve theory and macroeconomics.

The critical theoretical juncture was the [Friedman \(1968\)–Phelps \(1968\)](#) reformulation of Phillips curve theory in the late 1960s. That reformulation shifted the focus of Phillips curve research to the issue of expectation formation, closing an alternative research program suggested by [Tobin \(1971a,b\)](#) that focused on incorporation of inflation expectations.

Tobin’s alternative program was abandoned because it is logically incompatible with macro models that have a single aggregate labor market, and instead requires adoption of multi-sector labor markets. This gave the Friedman–Phelps approach a strategic advantage since it was compatible with single good–single labor market macro models that macroeconomists are familiar with and which are also easier to use.

The paper is both a literature review and an extension of Phillips curve theory. First, it uses the history of the Phillips curve to surface and explain the significance of

* Tel.: +1 202 667 5518.

E-mail address: mail@thomaspalley.com

the distinction between “formation” and “incorporation” of inflation expectations for Phillips curve theory. Second, it presents a simple encapsulating framework for modeling both multi-sector and heterogeneous agent approaches to the Phillips curve. Third, using that framework, it presents a multi-sector model that incorporates labor market conflict. The result is a hybrid model that fuses Keynesian demand-pull and Post Keynesian conflict inflation theory. Fourth, and most importantly, the paper shows how the economic welfare and policy significance of the Phillips curve is dramatically impacted by choice of theoretical explanation. Explaining the Phillips curve by reference to expectation formation keeps the Phillips curve in the orbit of natural rate thinking where there is no welfare justification for monetary policy aimed at reducing unemployment. That is because the trade-off only exists because of systematic inflation expectation errors and the Pareto optimal policy is to avoid creating such expectation errors. In contrast, if the Phillips curve is explained through intentionally incomplete incorporation of inflation expectations, there is a Pareto improving policy rationale for higher inflation that lowers unemployment. This provides a welfare economics rationale for Keynesian activist policies that reduce unemployment at the cost of higher inflation.

2. The original Phillips curve: the Phillips–Lipsey nominal wage model

The history of the Phillips curve begins with Phillips' (1958) seminal paper that reported a negative relation in the United Kingdom between the rate of nominal wage change and the unemployment rate over the period 1861 and 1957. Phillips' finding was quickly incorporated into macroeconomics as if it were a theoretically founded relation. In this regard, an article by Samuelson and Solow (1960) was especially influential, as it suggested how the Phillips curve might be relevant for anti-inflation policy. Since provision of policy guidance has always been an important motivation behind Keynesian structural macroeconomic modeling, this provided an impetus for incorporating the Phillips curve in macro models.

Though quickly incorporated into theoretical macroeconomics, the Phillips curve was actually an empirical finding. That means it has always needed a theoretical explanation.¹ Lipsey (1960) offered a first theoretical explanation, arguing the Phillips curve reflected a process of gradual disequilibrium adjustment in a conventional

aggregate labor market. That process was described as follows:

$$w = f(u - u^*) \quad f(0) = 0, \quad f' < 0, \quad f'' < 0 \quad (1.1)$$

where w = nominal wage inflation; u = actual unemployment rate; and u^* = rate of unemployment (frictional and structural) associated with full employment. According to the Lipsey model, conditions of excess labor demand cause nominal wage inflation, while conditions of excess labor supply cause nominal wage deflation.

Lipsey's (1960) theoretical formulation of the Phillips curve was quickly adopted, but almost immediately the empirical Phillips curve began to display instability, shifting up in unemployment rate–inflation space. This shift prompted search for a theoretical repair, and that repair ended up fundamentally transforming macroeconomics and shifting it in a direction that still holds.

3. The Friedman–Phelps Phillips curve: adaptive expectations in an aggregate neo-classical labor market

The theoretical repair and transformation of the Phillips curve involved two steps. Step one was the recognition that labor markets determine real wages. Consequently, if the Phillips curve is the product of imbalance between labor supply and demand, it should determine real wage inflation. That implies a Phillips curve of the form²

$$\omega = f(u - u^*) \quad f(0) = 0, \quad f' < 0, \quad f'' < 0 \quad (2.1)$$

ω = real wage inflation. Defining real wage inflation as

$$\omega = w - \pi \quad (2.2)$$

π = rate of price inflation. Substituting Eq. (2.2) into Eq. (2.1) then implies the Phillips curve should take the form:

$$w = f(u - u^*) + \pi \quad (2.3)$$

Step two was Friedman (1968) and Phelps' (1968) incorporation of inflation expectations into the nominal wage adjustment process, so that the Phillips curve becomes:

$$w = f(u - u^*) + \pi^e \quad (2.4)$$

π^e = expected inflation. Assuming labor is the only cost of production and there is no productivity growth, actual inflation is then given by

$$\pi = w \quad (2.5)$$

Substituting (2.5) into (2.4) then yields a Friedman–Phelps price inflation Phillips curve given by

$$\pi = f(u - u^*) + \pi^e \quad (2.6)$$

This formulation places inflation expectations center stage and it has essentially set the course of Phillips curve research for the past 40 years.³

¹ Tobin (1972, re-printed 1975, p. 45) has a lovely description of the Phillips curve as “an empirical finding in search of a theory, like Pirandello characters in search of an author”. Over the past three decades the empirical validity of the Phillips curve has become increasingly contested. New classical macroeconomics rejects the existence of a negatively sloped relation between the rates of inflation and unemployment and instead posits a relation between the change in inflation and the change in the unemployment rate. As discussed later in this paper, some economists with Keynesian proclivities now view the Phillips curve as backward bending. That shape explains why linear regression techniques have difficulty detecting it, and the difficulty is compounded by the problem of structural shifts.

² If there is labor productivity growth real wages should grow at the rate of productivity growth. That implies adding a constant term to Eq. (2.1). For simplicity, the issue of productivity growth is abstracted from throughout the paper.

³ A referee pointed out that Friedman's (1968) natural rate of unemployment is exactly analogous with Champernowne's (1936) notion of

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