

# Long-run inflation-unemployment dynamics: The Spanish Phillips curve and economic policy

Marika Karanassou<sup>a,b</sup>, Hector Sala<sup>c,b,\*</sup>, Dennis J. Snower<sup>d,e</sup>

<sup>a</sup> Department of Economics, Queen Mary, University of London, Mile End Road, London E1 4NS, UK

<sup>b</sup> IZA, Bonn, Germany

<sup>c</sup> Departament d'Economia Aplicada, Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

<sup>d</sup> President, Kiel Institute for the World Economy, Dusternbrooker Weg 120, 24105 Kiel, Germany

<sup>e</sup> Department of Economics, Christian-Albrechts-University Kiel, Olshavsenstrasse 40, 24118 Kiel, Germany

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## Abstract

This paper takes a new look at the long-run dynamics of inflation and unemployment in response to permanent changes in the growth rate of the money supply. We examine the Phillips curve from the perspective of what we call “frictional growth,” i.e. the interaction between money growth and nominal frictions. After presenting a theoretical model of this phenomenon, we construct an empirical model of the Spanish economy and, in this context, we evaluate the long-run inflation-unemployment tradeoff for Spain and examine how recent policy changes have affected it.

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## 1. Introduction

This paper takes a new look at the long-run dynamics of inflation and unemployment in response to permanent changes in the growth rate of the money supply. We examine the Phillips curve from

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\* Corresponding author. Tel.: +34 93 581 27 79; fax: +34 93 581 22 92.

*E-mail addresses:* [m.karanassou@qmul.ac.uk](mailto:m.karanassou@qmul.ac.uk) (M. Karanassou), [hector.sala@uab.es](mailto:hector.sala@uab.es) (H. Sala), [d.snower@ifw-kiel.de](mailto:d.snower@ifw-kiel.de) (D.J. Snower).

the perspective of what we call “frictional growth,” i.e. the interaction between money growth and nominal frictions. In this context, we show a long-run tradeoff between inflation and unemployment can arise, even when agents have rational expectations and no money illusion and there are no permanent nominal rigidities. After presenting a theoretical model of this phenomenon, we construct an empirical model of the Spanish economy that aims to capture the essential features of the interplay between money growth and prolonged nominal adjustment processes. In this framework, we evaluate the long-run inflation-unemployment tradeoff for Spain and examine how recent policy changes have affected it.

The mainstay analysis of inflation and unemployment rests on the standard assumption that economic agents make their demand and supply decisions on the basis of real variables alone and thus, in the long-run labor market equilibrium, a change in the money supply has no real effects; it simply changes all nominal variables in proportion. It was on the basis of such money neutrality that Friedman (1968) and Phelps (1968) formulated the natural rate (or NAIRU) hypothesis, in which there is no permanent tradeoff between inflation and unemployment.<sup>1</sup>

We show that in the presence of money growth and time-contingent nominal contracts, this argument does not necessarily hold. Under plausible circumstances, namely a nonzero discount rate, changes in money growth may affect the unemployment rate and other real variables in the long-run. This result enables our analysis to avoid a well documented – but frequently ignored – counterfactual prediction of the NAIRU theory: Supposing that the NAIRU is reasonably stable through time – a commonly made assumption – inflation falls (rises) without limit when unemployment is high (low).

Our model of the Phillips curve rests on three empirical regularities: (i) the growth rate of the money supply is nonzero, (ii) there is some nominal inertia, so that a current nominal variable is slow to adjust to money growth shocks, and (iii) unemployment is influenced by the ratio of the nominal money supply to that nominal variable (such as the ratio of the money supply to the price level).

The first regularity provides a reasonable time-series description of the money supply in most OECD countries. The second stylized fact is well established empirically and has been rationalized theoretically.<sup>2</sup> In the presence of staggered time-contingent nominal contracts, current wages are a weighted average of their past and expected future values. It can be shown that when there is positive time discounting the past is weighted more heavily than the future. It is this “intertemporal weighting asymmetry” that allows the phenomenon of frictional growth to manifest itself and produce a long-run inflation-unemployment tradeoff. The third regularity can take a variety of conventional forms, e.g. a change in the ratio of the money supply to the price level may affect aggregate demand and thereby the unemployment rate.

Our analysis is akin to several recent breakthroughs concerning the relation between real and monetary activities. Akerlof, Dickens and Perry (1996, 2000) show that in the presence of permanent downward wage rigidities arising from non-rational expectations, there is a downward-

<sup>1</sup> Recent microfoundations of the New Phillips Curve often generate a relation of the form  $\pi_t = \beta E_t \pi_{t+1} - a(u_t - u^n) + \varepsilon_t$ , where  $\pi$  is the inflation rate,  $u$  the unemployment rate,  $u^n$  the natural rate of unemployment or NAIRU,  $\beta$  the discount factor, and  $\varepsilon_t$  is white noise. This Phillips curve is generally taken to be virtually vertical, on the reasoning that the discount factor  $\beta$  is close to unity. Accordingly, in policy analysis this factor is usually set equal to unity and the focus of interest is predominantly the persistence of inflation, rather than permanent real effects of monetary policy.

<sup>2</sup> See, for example, Taylor (1979) on wage staggering, Calvo (1983), or Lindbeck and Snower (1999) on price precommitment with production lags. The literature on the effectiveness monetary policy under wage-price staggering has been surveyed by Clarida, Galí and Gertler (1999), Goodfriend and King (1997), Mankiw (2001), and others.

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